INSTALLATION RESTORATION PROGRAM

FINAL
REMEDIAL ACTION SUMMARY REPORT

117TH AIR REFUELING WING
ALABAMA AIR NATIONAL GUARD
BIRMINGHAM INTERNATIONAL AIRPORT
BIRMINGHAM, ALABAMA

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The Installation Restoration Program was initiated by the Air National Guard (ANG) to evaluate potential contamination to the environment caused by past practices at its installations. During the 1988, in preparation for replacing the Petroleum, Oils, and Lubricants Facility, soil contamination and free product were encountered. Four separate investigations culminated in a UST removal and soil excavation between Mar 94 and Feb 95. This report documents oversight activities performed during the removal action. Seven 25,000 gal fuel tanks and a 500 gal sludge tank were removed, and 17,500 yd^3 of soil were excavated and bioremediated to below Alabama Department of Environmental Management's (ADEM) corrective action limit of 100 ppm total petroleum hydrocarbon. Soil was excavated below the total depth of the extant wells, which were replaced at the end of the project. No petroleum-related products were found in groundwater following remediation. The report recommends no further actions need be taken at this site, though ADEM requested another groundwater monitoring well and round of samples.

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MARCH 1998

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LIST OF ACRONYMS

ADEM	Alabama Department of Environmental Management
ANG	Air National Guard
ARARs	Applicable or Relevant and Appropriate Requirements
AVGAS	Aviation Gasoline
BGS	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
EMC	Environmental Materials Consultants, Inc.
EPA	Environmental Protection Agency
H&M	H&M Associates, Inc.
JP-4	Jet Propulsion Fuel No. 4
HAZWRAP	Hazardous Waste Remedial Actions Program
IAP	International Airport
IRP	Installation Restoration Program
NGB	National Guard Bureau
NOV	Notice of Violation
PAHs	Polynuclear Aromatic Hydrocarbons
PEER	PEER Consultants, P.C.
PID	Photoionization Detector
POL	Petroleum, Oils, and Lubricants
PVC	Polyvinyl Chloride
SA	Site Assessment
TPH	Total Petroleum Hydrocarbons
UST	Underground Storage Tank System

EXECUTIVE SUMMARY

Remedial action and closure assessment activities were conducted at Installation Restoration Program (IRP) Site 11 - the Old Petroleum, Oils, and Lubricants (POL) Facility located at the Birmingham International Airport (IAP), Alabama Air National Guard (ANG), Birmingham, Alabama. These activities were conducted from March 4, 1994, to October 3, 1996, and involved the removal of seven 25,000-gal underground storage tank systems (USTs); one 500-gal underground sludge tank, piping, and associated appurtenances; the excavation and bioremediation of approximately 17,500 yd^3 of petroleum contaminated soils; and associated soil and groundwater closure sampling. The eight tanks were removed from a common pit.

Although a preliminary assessment was conducted at the base in August of 1987, this site was not identified at that time. The site was added to the IRP when the Alabama Department of Environmental Management (ADEM) issued a Notice of Violation (NOV) due to confirmation of a release of petroleum products at the site. A total of four investigations have been conducted at the site including: a soil contamination assessment (Law 1988), a subsurface exploration (Law 1989), a site investigation (CH2M Hill 1991), and a site assessment (SA) (PEER 1992). The analytical results obtained during the SA indicated that soils in the vicinity of Site 11 contained concentrations of total petroleum hydrocarbons (TPH) above the ADEM action limit of 100 mg/kg TPH.

The UST removal and soil excavation activities were conducted from March 1994 to February 1995. Upon removal, the seven 25,000-gal tanks were cleaned according to ADEM guidance and taken to the H&M Associates, Inc. (removal contractor) scrap yard and cut up. The 500-gal fiberglass sludge tank was crushed and taken to ACMAR Regional Landfill, and associated piping was hauled to Mindis Recycling for disposal. Eventually, approximately 17,500 yd^3 of soil was excavated and bioremediated at the site.

The TPH-contaminated soils at Site 11 were treated on-site using ex-situ bioremediation in bio-cells. Contaminated soils were to be spread and treated in bio-cells, and then placed within a bioremediation system constructed in the UST pit for further treatment. However, soils were successfully bioremediated below the ADEM limit of 100 mg/kg in the bio-cells, and the ANG

determined that construction of the in-situ bioremediation system would not be necessary. The bioremediated soils were stockpiled, and a portion of the bioremediated soils were used as fill in both the former UST pit and the overexcavated area to bring the soil surface up to grade.

During the soil excavation activities, over 1,300 soil samples were collected and submitted to a laboratory to determine whether or not TPH concentrations in the side walls and floors of the UST pit and the overexcavated area were below the ADEM action limit of 100 mg/kg. Additionally, soil samples collected from beneath the former locations of the USTs and the sludge tank were analyzed for lead to determine if soils exceeded the ADEM action limit of 100 mg/kg lead. Analytical results of the soil samples demonstrated that no concentrations of TPH or lead were present above the ADEM action limits in the tank pit, or in the over-excavated areas during the final sampling rounds. Concentrations of TPH in the side walls and floors of the UST pit and overexcavated areas ranged from not detected to 89 mg/kg, with the majority of the soil samples containing less than 30 mg/kg TPH. Lead concentrations in soils beneath the USTs and the sludge tank ranged from 15 to 22 mg/kg.

As discussed in the SA, free product was found only in the shallow groundwater influenced by the UST pit with none being identified in the deeper (water table) groundwater (PEER 1992). Twenty-one of the 23 monitoring wells installed at the site during previous investigations were abandoned while excavating contaminated soils from the site. The abandoned wells included four wells which had been identified as containing free product (MW-07, MW-12, MW-13, and MW-15). These wells were abandoned by completely removing the wells when excavating contaminated soils which surrounded them. In October 1996, four new wells were installed in the vicinity of the site. One of the wells was installed hydraulically upgradient of the location of the former UST pit and the three remaining wells were installed hydraulically downgradient of the former UST pit. No free product was present in any of these wells at the time of sampling on October 2 and 3, 1996.

Groundwater samples were collected from four newly installed wells to evaluate the effectiveness of the remedial action and closure assessment activities on October 2 and 3, 1996. The groundwater samples were analyzed for benzene, ethylbenzene, toluene, and xylenes (BTEX), and

polynuclear aromatic hydrocarbons (PAHs). The analytical results demonstrated that no concentrations of BTEX or PAHs (above method detection limits) were present in the samples collected from the newly installed groundwater monitoring wells.

The remedial activities for petroleum contaminants at Site 11 are complete, and no further collection or analysis of soil samples is recommended since the source of petroleum contamination (the USTs and the sludge tank) at Site 11 has been removed and the associated contaminated soils have been excavated and bioremediated below the ADEM action limit of 100 mg/kg. No petroleum-related contaminants (BTEX and PAHs) were present in site groundwater based on sampling results from the four recently installed wells in October 1996. These results indicate excavation (and thus remediation) occurred to below the groundwater table and affected areas. However, ADEM has requested that additional groundwater samples be collected hydraulically downgradient from the original extent of soil contamination. During the Remedial Investigation (RI) for three other sites, a monitoring well will be installed at this site. Groundwater level measurements will be obtained and groundwater samples will be collected from the four existing and one proposed monitoring wells.

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1.0 INTRODUCTION

This Report documents Installation Restoration Program (IRP) remedial action and closure assessment activities conducted at Site 11 - the Old Petroleum, Oils, and Lubricants (POL) Facility located at the Birmingham International Airport (IAP), Alabama Air National Guard (ANG), Birmingham, Alabama. The activities were conducted from March 4, 1994, to October 3, 1996, in order to remediate contamination at the site. These actions also addressed deficiencies noted in a Notice of Violation (NOV) issued on April 27, 1988, by the Alabama Department of Environmental Management (ADEM) due to confirmation of a release of petroleum products. The tanks at the site previously contained jet propulsion fuel no. 4 (JP-4) and aviation gasoline (AVGAS). The location of the base is shown on Figure 1.1, and the location of Site 11 is shown on Figure 1.2.

As a part of the remedial action and closure assessment activities, seven 25,000-gal underground storage tank systems (USTs) and one 500-gal sludge tank were removed from Site 11, and petroleum-contaminated soils associated with the USTs were excavated and bioremediated in the vicinity of the site. Additionally, soil samples from the treated soils, and groundwater samples from four newly installed monitoring wells were collected and analyzed in order to evaluate the effectiveness of the remedial action and closure assessment activities.

H&M Associates, Inc. (H&M), and Environmental Materials Consultants, Inc. (EMC) of Montgomery, Alabama, performed the remedial action and closure assessment activities, respectively. PEER Consultants, P.C. (PEER) provided oversight services to the ANG during the activities under the direction of the Hazardous Waste Remedial Actions Program (HAZWRAP) through the Rapid Response Initiative. PEER prepared this Report for the ANG under National Guard Bureau (NGB) contract DAHA90-94-D-0011. The oversight services included:

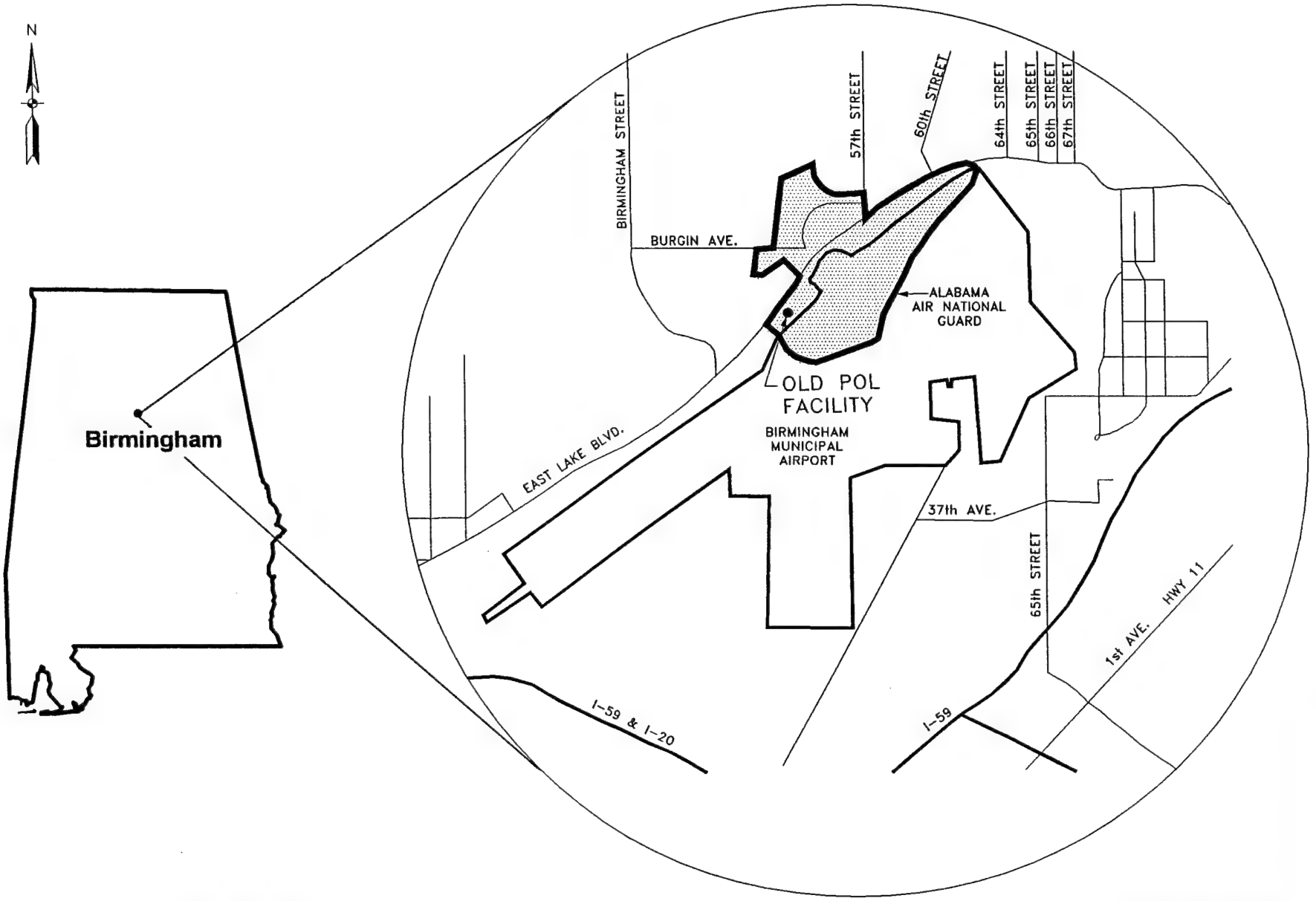

FIGURE 1.1	BASE LOCATION MAP ALABAMA AIR NATIONAL GUARD BASE BIRMINGHAM, ALABAMA	PEER PROJ. 1566-016 FILE: AANG012.DWG

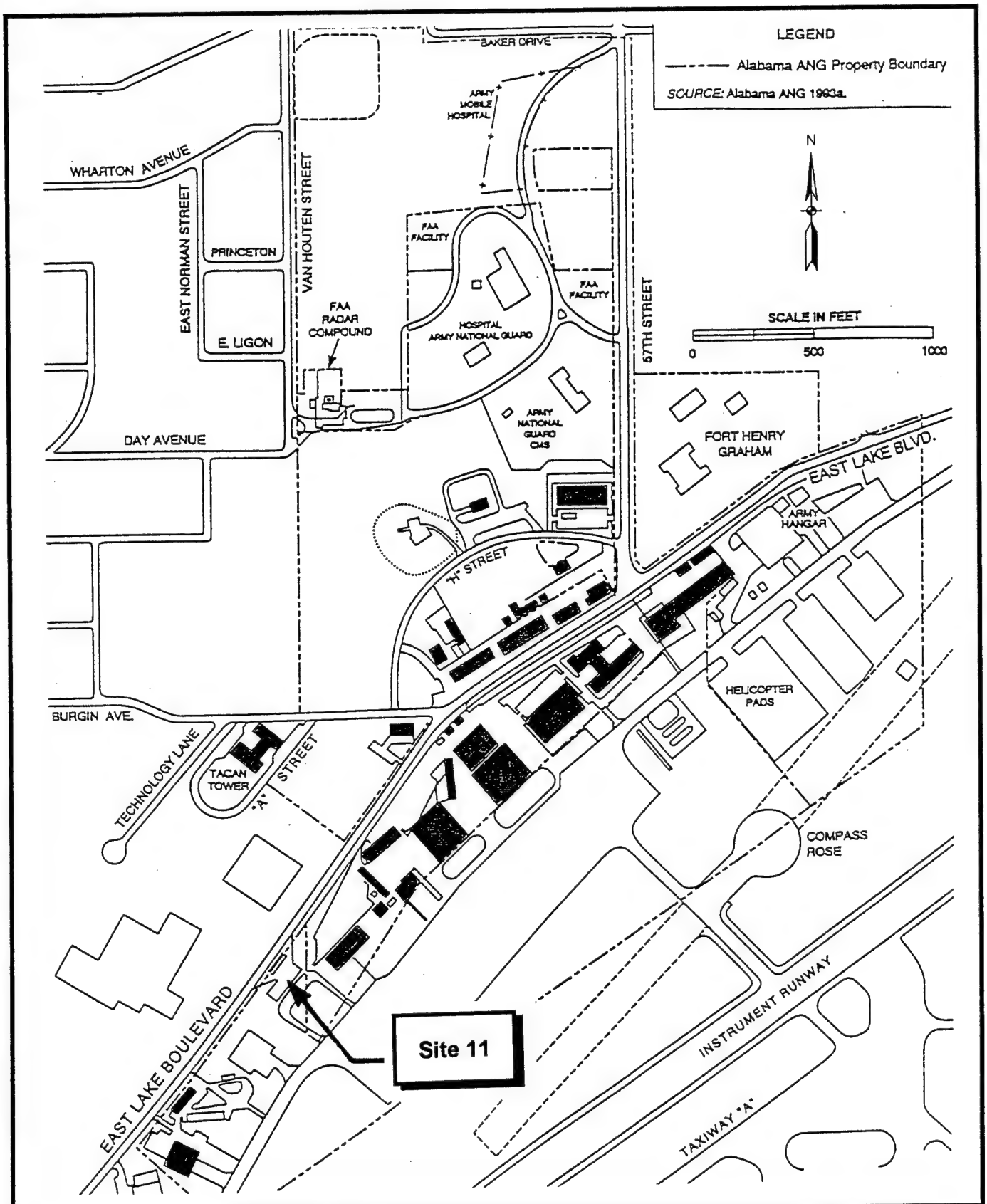

FIGURE 1.2	SITE LOCATION MAP ALABAMA AIR NATIONAL GUARD BASE BIRMINGHAM, ALABAMA	PEER PROJ: 1566-016 FILE: AANG001.DWG A

- Providing on-site oversight for 71 days during the remedial activities;
- Documenting the work accomplished;
- Assisting in sample collection;
- Reviewing contractor submittals and proposals;
- Providing ongoing routine technical assistance to ANG personnel; and
- Preparing the Remedial Action Summary Report (this document).

This Remedial Action Summary Report is organized into six sections and seven appendices. Section 1.0 is the introduction to the Report. Section 2.0 describes the project history and the scope of the remediation activities. Section 3.0 briefly discusses the applicable or relevant and appropriate requirements (ARARs). Section 4.0 discusses the remediation activities and the site background. Section 5.0 discusses confirmatory sample collection procedures and results, and Section 6.0 describes the current status of the site based on the analytical results of the sampling activities. References are provided in Section 7.0. Appendix A and Appendix B contain abbreviated versions of the H&M technical proposal and the ADEM Guidelines for UST Closure, respectively. Appendix C provides the dates a PEER representative was present at the site, and Appendix D contains key photographs. Appendix E contains the analytical data. Appendix F contains the boring logs and well installation information.

2.0 BACKGROUND

On April 27, 1988, ADEM issued a NOV due to confirmation of a petroleum release from Site 11. This site was not identified during the August 1987 Preliminary Assessment, but was added to the ANG IRP as a result of the information contained in the NOV. Four reports contain information about investigations conducted at the site; they are:

- Report of Soil Contamination Assessment, Alabama Air National Guard POL Complex (Law 1988);
- Report of Subsurface Exploration, Alabama National Guard POL Complex (Law 1989);
- Site Investigation Report - 117th Tactical Reconnaissance Wing, Alabama Air National Guard, Army Aviation Support Facility, Birmingham Municipal Airport (CH2M Hill 1991); and
- Final Site Assessment Report and Corrective Action Plan for the Old POL Facility, 117th Tactical Reconnaissance Wing, Alabama Air National Guard Base, Birmingham Municipal Airport, Birmingham, Alabama (PEER 1992).

During the investigations, a total of 23 monitoring wells and 41 soil borings were installed. The majority of the wells and soil borings were installed in the unconsolidated deposits which were produced by weathering of bedrock. The unconsolidated deposits consist mostly of clay with traces of silt, which is interbedded with silt and sand stringers. The unconsolidated deposits are underlain by carbonate rocks of the Knox Group and Ketona Dolomite. A generalized geologic column for the base is provided in Figure 2.1.

Groundwater present at the site exists in the unconsolidated deposits and is mainly recharged through rainfall (PEER 1992). Observations by Law Engineering (Law 1989) indicated that stormwater runoff from East Lake Boulevard discharged directly into the tank pit containing

Geologic Unit[1]	Unit Thickness	Lithology
Residuum (Soil)	N/A	Clay with traces of silt containing silt and sand stringers.
Knox Group	2,000 ft+	Dolomite, medium- to dark-gray, thick-bedded, cherty in the lower part of Knox. The upper beds of Knox are dolomitic limestone and limestone. May contain solution cavities.
Ketona Dolomite	0 - 600 ft	Dolomite, brownish-gray, thick-bedded, chert-free, crystalline.

(1) The generalized geologic column for the region contains several other geologic formations which are positioned above and below the Knox Group and Ketona Dolomite. However, those units are not present at Site 11.

Figure 2.1. Site 11 - Generalized Geologic Column

the seven USTs. Additionally, it was reported that water levels in the tank pit rose to near the ground surface and remained higher than groundwater elevations in wells surrounding the UST pit for several days after a rainfall event. This indicates recharge of groundwater to soils outside the pit (Law 1989).

Specific information regarding the soil borings, monitoring wells, site geology, and hydrogeology is provided in the previously prepared reports.

In May 1993, the United States Property and Fiscal Officer for Alabama issued a Request for Proposal based on the results of the Site Assessment (SA) conducted at Site 11 (PEER 1992). On September 30, 1993, H&M was awarded a contract to remove and dispose of seven USTs and a sludge tank and associated appurtenances, to remove and dispose of associated appurtenances, and to bioremediate approximately 6,800 yd^3 of petroleum-contaminated soils. The resulting technical proposal submitted by H&M was prepared in conjunction with EMC. An abbreviated version of the technical proposal is included in Appendix A. For the full version of the technical proposal, contact Capt. Glenn F. Bailey (Base Environmental Manager) at (205) 841-9291.

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3.0 ARARS

This section summarizes the ADEM UST closure guidelines and the associated action limits for soil and groundwater cleanup for petroleum contaminated sites. An abbreviated version of the ADEM guidance document, "UST Closure Requirements," is provided in Appendix B. The ADEM document provides guidelines for collection and analysis of soil and groundwater samples, and action limits during UST closures.

The number of soil samples to be collected is dependent upon the size of the UST pit, the number of tanks in the pit, and the length of the associated piping trenches. In UST pits, one side wall sample must be collected for every 25 ft of wall from the region of the wall which corresponds to the lower one-third of the tank diameter. In addition, one soil sample must be collected from the pit base beneath each former tank, and one soil sample must be collected for every 10 linear ft in any existing piping trenches. Soil samples must be analyzed for total petroleum hydrocarbons (TPH), and lead (if applicable).

Whether or not groundwater samples are collected is based on the concentration of TPH in the required samples from the UST pit and/or piping trenches, and the elevation of the seasonal high water table in the vicinity of the pit. When the concentration of TPH is greater than 10 mg/kg, and the seasonal high groundwater table is less than 5 ft below the bottom of the tank excavation pit or piping trench, as in this case, then groundwater samples must be collected from a minimum of four monitoring wells. At Site 11, ADEM determined that groundwater sampling was necessary since water was present in the UST pit during the tank removal operations. The requirements indicate that one of the monitoring wells to be sampled must be located upgradient of the UST pit, and the three remaining wells to be sampled must be located downgradient of the UST pit. Groundwater samples must be analyzed for polynuclear aromatic hydrocarbons (PAHs) and benzene, ethylbenzene, toluene, and total xylenes (BTEX).

Although the ADEM action limits for soil were revised during the time period following completion of the SA, which could potentially have resulted in redefinition of the extent of soil contamination at the site, an agreement was reached between ADEM and the base which allowed

the ADEM corrective action limits (100 mg/kg TPH) which were in effect at the time of the SA to remain in effect through the remedial actions and project completion (PEER 1994). According to ADEM, excavated soils which contain concentrations of TPH that are less than 100 mg/kg are not considered to be petroleum contaminated, and may be used as general fill on-site. Soils which contain concentrations of TPH which equal or exceed 100 mg/kg are considered to be petroleum-contaminated and must be treated and disposed accordingly by an ADEM accepted in-situ or ex-situ technique. The ADEM action limit for lead in soil is 100 mg/kg. Corrective action limits for groundwater include limits for benzene (5 µg/L), ethylbenzene (680 µg/L), toluene (2,000 µg/L) and xylenes (10,000 µg/L).

4.0 REMEDIATION ACTIVITIES

The remediation activities were conducted from March 1994 to February 1995 at Site 11 and included the following:

- Removal and disposal of the seven USTs, and the sludge tank and associated appurtenances;
- Removal and disposal of the concrete pad beneath the USTs; and
- Bioremediation of petroleum-contaminated soil.

The seven USTs and the sludge tank were removed from a common pit due to the proximity of the USTs to the sludge tank. PEER provided oversight services for 71 days during the activities, which were conducted from March to November 1994. Oversight services were not provided during groundwater sampling which was conducted on October 2 and 3, 1996. A table which includes the dates oversight activities were conducted and the corresponding field activities is provided in Appendix C. In order to review the oversight logbook, contact Capt. Glenn F. Bailey (Base Environmental Manager) at (205) 841-9291. Key photographs of the remedial activities are provided in Appendix D. The ADEM UST Closure Site Assessment Report form which documents the tank removals and the specific methods and procedures used is available in the Closure Assessment Report submitted to the ANG on June 29, 1994 (EMC 1994).

4.1 SITE 11 - BACKGROUND

Four previous investigations were conducted at Site 11 to evaluate potential soil and groundwater contamination due to the leaking USTs. The details of the previous investigations are contained in the reports as specified in Section 2.0.

Analytical results obtained during the SA indicated that soils in the vicinity of Site 11 contained concentrations of TPH above the corrective action limit of 100 mg/kg. Detections of TPH in soil samples above the corrective action limit of 100 mg/kg were found to range to a high of 5,700 mg/kg and were concentrated in the UST pit and in an area south of the UST pit. The

area where the 17,500 yd^3 of soil was excavated and bioremediated is shown in Figure 4.1. The locations of the former soil borings are shown in Figure 4.2. The volume of contaminated soil present at the site was estimated to be approximately 6,800 yd^3 based on the results of the SA (PEER 1992). Concentrations of TPH which were above the corrective action limit in soils during the SA are provided in Table 4.1.

In addition to the soil contamination, free product was detected in four monitoring wells south of the UST pit (MW-07, MW-12, MW-13, and MW-15). The locations of the former monitoring wells are shown on Figure 4.2. According to the SA Report, groundwater at the site existed under confined and semiconfined conditions, and was influenced by infiltration of groundwater from the fill within the UST pit into the surrounding native soils along the UST distribution lines. Groundwater was present at the site at elevations ranging from 7 to 19 ft below ground surface (BGS), with the shallow elevations representing infiltration of groundwater from the UST pit and the deeper groundwater elevations representing water table conditions. Free product was found only in the shallow groundwater influenced by the UST pit with none being identified in the deeper (water table) groundwater (PEER 1992).

4.2 SOILS BIOREMEDIATION

The TPH-contaminated soils at Site 11 were treated using ex-situ bioremediation in bio-cells. As stated in the H&M proposal, contaminated soils were to be spread and treated in bio-cells, and after treatment in the bio-cells, the soils were to be placed within a bioremediation system constructed in the UST pit for further treatment. However, the soils were successfully bioremediated below the ADEM limit of 100 mg/kg with only treatment in the bio-cells, and the ANG determined that construction of the in-situ bioremediation system would not be necessary. The following paragraphs describe the bioremedation of site soils.

The contaminated soils were excavated from the UST pit and from additional areas south and east of the pit. The soils were excavated using a trackhoe, placed in dump trucks, and dumped in one of three bio-cells. The three bio-cells were prepared south and east of the UST pit and were lined with plastic and surrounded by a wooden form. After placement in the bio-cells, the soils were tilled using a mechanical tiller and then treated with a mixture of aerobic and anaerobic bacteria

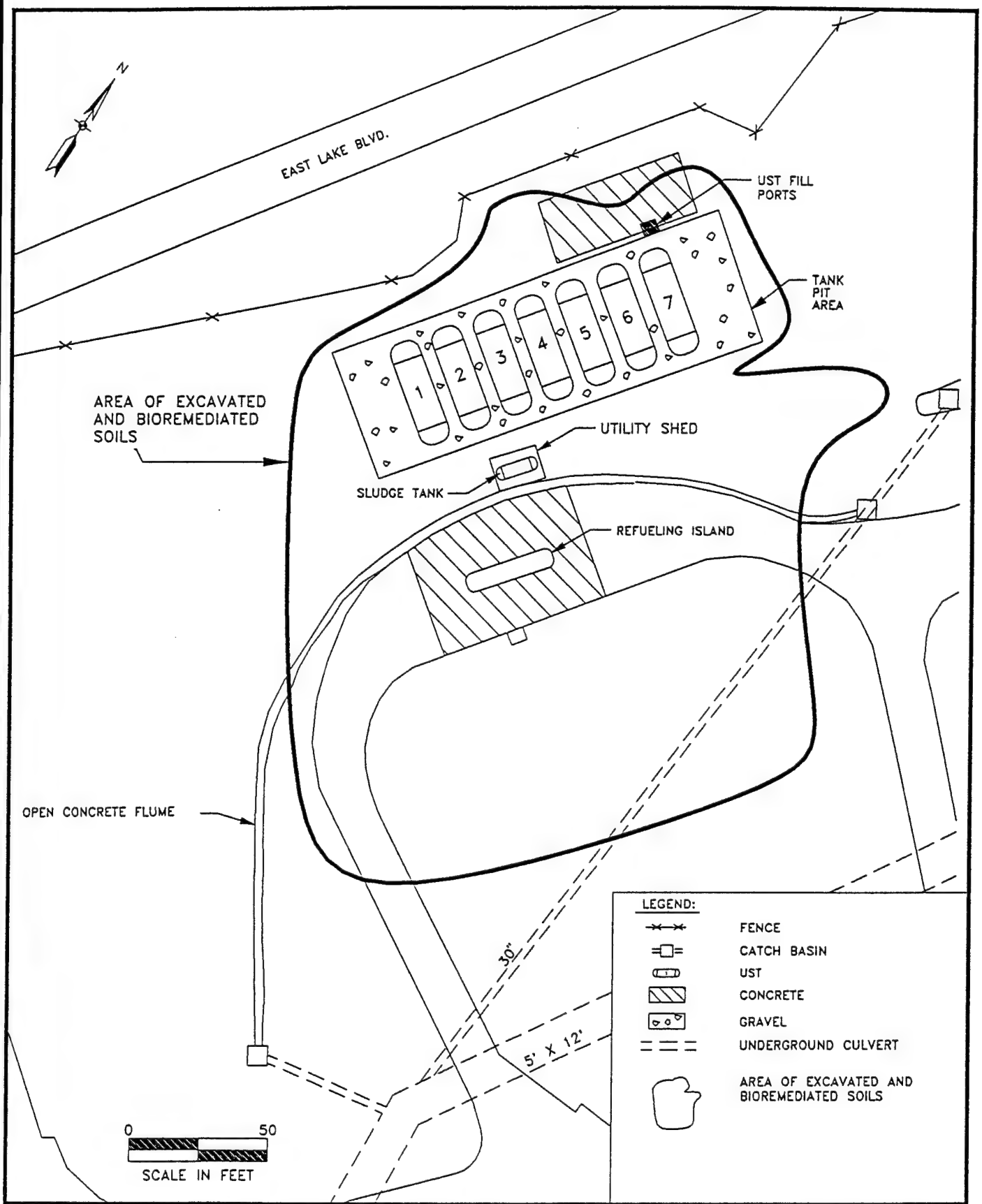

FIGURE 4.1	AREA OF EXCAVATED AND BIOREMEDIATED SOILS ALABAMA AIR NATIONAL GUARD BIRMINGHAM, ALABAMA	PEER PROJ: 1566-016 FILE: AANG001.DWG B

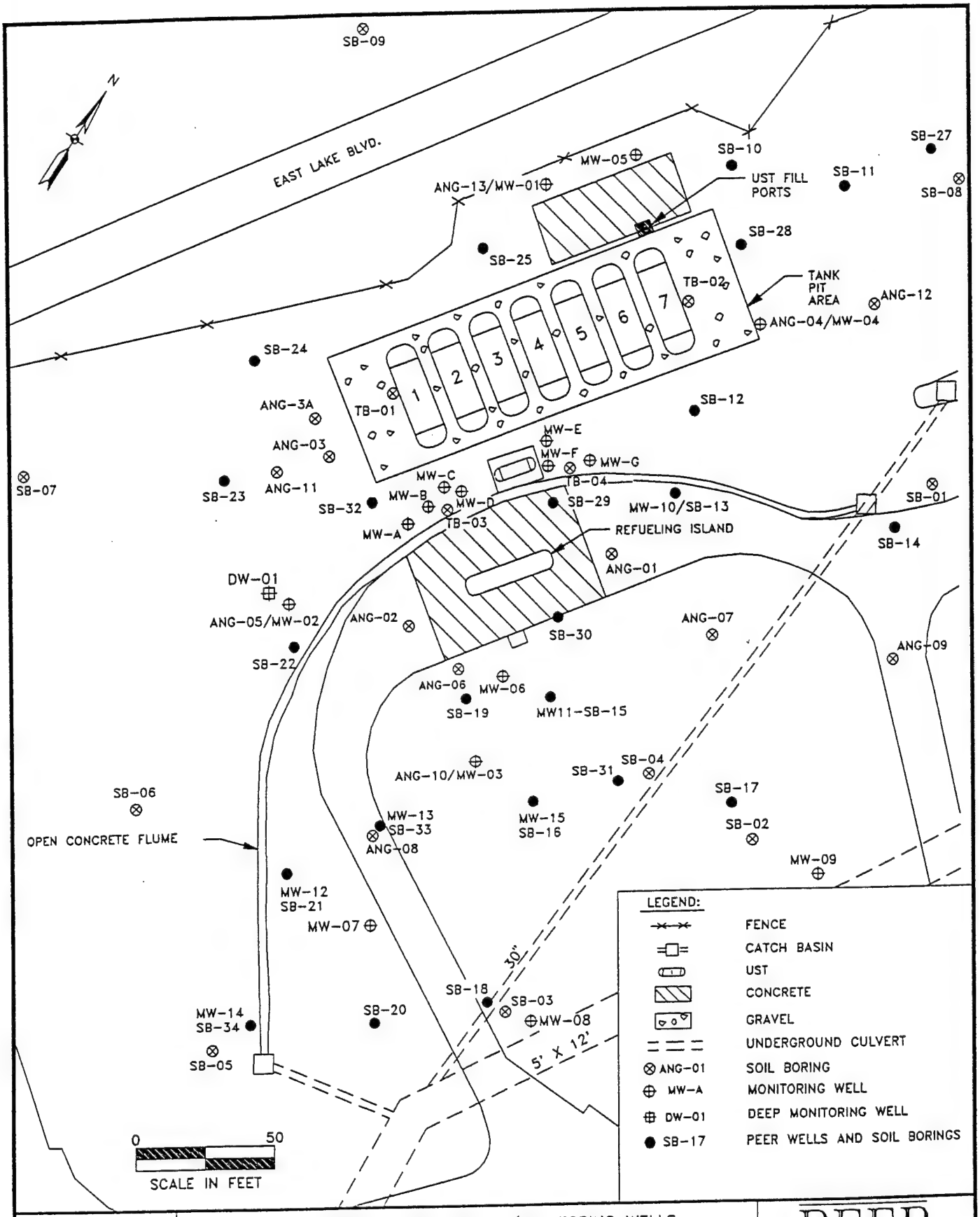

FIGURE 4.2

LOCATION OF PREVIOUS SOIL BORING/MONITORING WELLS

ALABAMA AIR NATIONAL GUARD
BIRMINGHAM, ALABAMA

PEER

PROJ: 1566-016
FILE: AANG003A.DWG

Table 4.1
Previous Analytical Results
from the Site Assessment
for the Old Petroleum, Oils, and Lubricants Facility (Site 11)
Birmingham International Airport
Birmingham, Alabama

Sample Location	Sample Number	Approximate Depth (ft BGS)	TPH Concentration (mg/kg)
SB-10	02	2 - 4	140
	05	8 - 10	140
	06	10 - 12	130
SB-15	01	0 - 2	6,500
	04	6 - 8	760
SB-16	02	2 - 4	260
	03	4 - 6	660
	04	6 - 8	560
SB-19	02	2 - 4	550
	04	6 - 8	140
	09	16 - 18	130
SB-21	08	14 - 16	370
	09	16 - 18	3,100
SB-22	03	4 - 6	570
SB-25	01	0 - 2	200
	03	4 - 6	320
	04	6 - 8	100
SB-29	02	1 - 3	190
SB-30	03	3 - 5	150
	04	5 - 7	190
	05	7 - 9	260
SB-31	04	6 - 8	140
SB-32	02	2 - 4	170
	03	4 - 6	490
	05	8 - 10	540
	06	10 - 12	100
SB-33	09	15 - 17	230
	10	17 - 19	2,700

Source: PEER 1992.
BGS = below ground surface.

(Hydrobac S) at a quantity of 0.3 lbs/ yd^3 of soil. Nutrients for the bacteria were added at a rate of 3.6 lbs/yd^3 of soil in the form of ammonium nitrate, diammonium phosphate, and potassium nitrate. An emulsifier (Polybac E) was added at a rate of 0.07 lbs/yd^3 of soil to assist with thorough mixing. Additionally, water was added from one of the USTs (used as a holding tank) to the soils until the moisture content was between 15 and 20 percent. The soils were then tilled after treatment to ensure proper mixing of the soils with the additives. The soil bio-cells were covered with plastic sheeting during rain storms. Once the soils were tilled the second time, they were removed from the bio-cells and placed in a soil stockpile to make room for newly excavated soils. Plastic sheeting was used to cover the soil stockpile between soil additions, and was used to line the ground surface beneath the soil stockpile.

Originally, it was estimated that approximately 6,800 yd^3 of soil would need to be excavated and treated at Site 11. However, several areas of soil contamination were present at the site which were not previously anticipated. Consequently, a total of approximately 17,500 yd^3 of soil was excavated and treated at the site through a series of three change orders. After treatment and confirmation sampling, some of the treated soils from the soil stockpile were used as fill in the former UST pit and the surrounding overexcavated areas. The remaining treated soils are still stockpiled on 10-mil plastic in the vicinity of Building 301 on the base, and are utilized as fill for various projects on-base.

4.3 MONITORING WELL ABANDONMENT

During the remedial action and closure activities, all 23 monitoring wells were abandoned or removed from Site 11. The former locations of the abandoned monitoring wells are shown on Figure 4.2. Since that time, four new monitoring wells were installed at the site in order to fulfill ADEM closure requirements. These replacement wells are discussed in Section 5.6.

The wells were abandoned by removing the polyvinyl chloride (PVC) casings and sealing the remaining boreholes with bentonite-cement grout. Additionally, several wells which were screened in the shallow groundwater influenced by the UST pit were completely removed. These wells were located in areas of TPH contamination where the floor of the overexcavated area was

deeper than the well. Consequently, these wells and the soils surrounding them were completely removed, and no formal abandonment procedures were necessary.

4.4 REMEDIAL ACTIVITY DEBRIS

Debris generated during the remedial activities included seven 25,000-gal steel tanks, one 500-gal fiberglass sludge tank, associated piping and other appurtenances, one 55-gal drum containing petroleum and absorbent material, and concrete and asphalt pavement.

Approximately 250 yd^3 of asphalt was removed from a driveway in the vicinity of the site with a trackhoe. The concrete pad in the UST pit was broken up by repeated dropping of a 3,000-lb weight, and was removed using a trackhoe. Removal and disposal of the concrete pad was completed on April 23, 1994. The concrete pad consisted of approximately 200 yd^3 of concrete. Additionally, approximately 130 yd^3 of concrete associated with the pump island was removed.

One 55-gal drum containing petroleum and petroleum-contaminated absorbent pads and booms was disposed of at Mindis Recycling.

Each of the seven 25,000-gal tanks were emptied of their contents and cleaned according to American Petroleum Institute Publication 2015 as suggested by ADEM guidance. Each of the tanks were purged with dry ice upon removal (except for one used as a temporary holding tank), and square plates of approximately 1 ft x 1 ft were cut from the end of each tank. Then, the tanks were transferred to H&M's scrap yard to be cut up. Tank piping and other scraps were hauled to Mindis Recycling for disposal. The remaining 25,000-gal tank was removed from the pit and placed immediately south of the tank pit to be used as a holding tank for water pumped from the excavation. The tanks were inspected by PEER at the scrap yard before being cut up. The inspection verified that each tank was numbered and properly labeled and that holes and corrosion pits were present in the tanks. The water in the holding tank after completion of bioremediation activities was discharged into the sanitary sewer upon receipt of laboratory analyses and ADEM approval. The holding tank was then purged with dry ice and taken to the scrap yard to be cut up. The 500-gal fiberglass sludge tank was emptied of its contents and cleaned according to

ADEM guidance. Upon removal from the pit, it was crushed and hauled to ACMAR Regional Landfill for disposal. No holes or cracks were noted in the walls of the sludge tank.

4.5 FREE PRODUCT REMOVAL

During the SA (PEER 1992), free product was identified in four monitoring wells including MW-07, MW-12, MW-13, and MW-15. In order to determine the quantity of free product, free product was removed from monitoring well MW-12 by bailing. Approximately 1 liter of free product was removed from well MW-12, and less than ½ liter of free product was removed from monitoring well MW-07. At the time of bailing, almost all of the free product present in the wells was removed except for a thin layer (less than 0.01 ft). Wells MW-13 and MW-15 contained free product in only trace quantities and were not bailed. The bailed free product was segregated from any water in the bailers, and placed in an aboveground storage tank in the vicinity of the site for disposal. The water was poured into a 55-gal drum for disposal. Free product was not removed from the other wells due to the small quantities present.

During the remedial action and closure assessment activities, small amounts of free product were observed in several areas of the UST pit during removal of the USTs. This free product was removed with absorbent pads and booms. The free product and associated absorbent materials obtained during the remedial action and closure assessment activities were stored in a 55-gal drum for disposal. A Free Product Recovery Report which documented removal of free product from the UST pit was submitted to ADEM on April 5, 1994 (EMC 1994). Additionally, on April 20, 1994, less than ½ liter of free product was present in wells MW-12 and MW-13. This free product was removed by bailing. A film of free product was found in well MW-07, but was not bailed due to the small amount found. No free product was found in MW-15 or any of the other wells at the site.

Twenty-one of the 23 monitoring wells installed at the site were abandoned, including the 4 wells which had been identified as containing free product. These wells were abandoned by completely removing the wells when excavating the contaminated soils which surrounded them. Additionally, the tanks and the soils of the UST pit, which were the source of the free product, were removed

from the site. In October 1996, four new wells were installed in the vicinity of the site. One of the wells was installed hydraulically upgradient of the location of the former UST pit and the remaining three wells were installed hydraulically downgradient of the former UST pit, following ADEM guidance. No free product was present in any of these wells.

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5.0 SAMPLING ACTIVITIES

The sampling activities were conducted from March 1994 to February 1995, and on October 3, 1996, when groundwater samples were collected from four newly installed wells. The sampling activities were conducted according to the Closure Assessment and Corrective Action Oversight Work Plan (PEER 1994), and the H&M Technical Proposal (May 1993). Both of these documents were reviewed and approved by ADEM prior to the start of work. During the excavation of contaminated soils, several rounds of side wall and pit floor samples were collected. The tanks and piping were all removed from a common pit. Consequently, collection of piping trench soil samples was unnecessary. This section will focus on the final rounds of confirmatory soil samples from the common pit of the 25,000-gal USTs and the sludge tank, and the final rounds of samples from the overexcavated areas. The following sampling activities were performed at Site 11:

- Collection of confirmation soil samples in the fuel tank pit and the sludge tank pit;
- Collection of confirmation soil samples in the over-excavated areas;
- Collection of soil samples from the bio-cells;
- Collection of soil samples from the soil stockpiles; and
- Collection of confirmation groundwater samples.

These sampling activities and the resulting analytical data are discussed in the following subsections. The analytical laboratory reports for the samples collected by PEER and the groundwater samples collected from the newly installed wells are provided in Appendix E. The laboratory analytical reports for the samples collected by EMC are provided in the Corrective Action Report (EMC 1995).

5.1 FUEL TANK PIT

Upon removal of the tanks from the common pit, a total of 56 samples were collected from the pit in the vicinity of the former 25,000-gal USTs. The samples were collected order to ensure that concentrations of TPH were below the ADEM action limit in the side walls and floor of the pit. Side wall samples were collected every 25 ft from the lower one-third portion of the walls in the

pit. Additionally, soil samples were collected from the pit floor below the previous location of each of the tanks. Each of the soil samples were analyzed for TPH using Environmental Protection Agency (EPA) Method 418.1 (infrared), and the soil samples collected beneath the former locations of the tanks also were analyzed for lead using EPA SW-846 Method 7000. Analytical results are presented in Table 5.1, and sample locations are shown in Figure 5.1.

The samples were collected in two sets. The first set of 27 samples was collected by EMC, and the second set of 29 samples were collected by PEER for independent confirmation of the analytical results. Prior to collection of the soil samples, the pit was visually inspected and field screened with a photoionization detector (PID) for photoionizable hydrocarbons such as benzene and xylenes. Field screening and visual observation indicated that a small area in the west wall of the pit was contaminated with petroleum products. Consequently, soil in this area was overexcavated after EMC obtained the samples, and prior to collection of the second set of samples by PEER.

EMC Samples

A total of 27 soil samples (EMC-1 through -27) were collected in the vicinity of the common tank pit on March 22, April 11, and April 26, 1994 by EMC. Samples were submitted to EMC Laboratory of Birmingham, Alabama, for analysis. Samples collected beneath the locations of the former tanks were obtained after the concrete pad was removed. The results indicated that no concentrations of TPH greater than the ADEM action limit of 100 mg/kg were found in the floor or side walls in the pit. Additionally, no concentrations of lead greater than the ADEM action limit of 100 mg/kg were found beneath the tanks. Analytical results of the side wall samples ranged from a low of not detected to a high of 24 mg/kg TPH, with an average detected concentration of 21 mg/kg TPH. Analytical results of pit floor samples ranged from a low of not detected to a high of 48 mg/kg TPH, with an average detected concentration of 28 mg/kg TPH. The lead analytical results of the pit floor samples ranged from a low of 16 to a high of 22 mg/kg, with an average concentration of 17 mg/kg lead. Several other metals also were detected in the samples. The detectable results for the other metals ranged from a high of 620 mg/kg (barium) to a low of 0.5 mg/kg (selenium). The remainder of the metals results are provided in the Corrective Action Report (EMC 1995).

Table 5.1
Closure Sampling Analytical Results
Old Petroleum, Oils, and Lubricants Facility (Site 11)
Birmingham International Airport
Birmingham, Alabama

Sample Locations No.	Field Sample No.	Sample Location	TPH Concentration (mg/kg)	Lead Concentration (mg/kg)
1 (EMC)	647/032294/TE/S-8	East Wall	ND	--
2 (EMC)	647/032294/TE/S-9	East Wall	12	--
3 (EMC)	647/032294/TE/S-10	South Wall	ND	--
4 (EMC)	647/032294/TE/S-11	South Wall	ND	--
5 (EMC)	647/032294/TE/S-12	South Wall	ND	--
6 (EMC)	647/032294/TE/S-13	South Wall	ND	--
7 (EMC)	647/032294/TE/S-14	South Wall	12	--
8 (EMC)	647/032294/TE/S-15	South Wall, Sludge Tank	23	--
9 (EMC)	647/032294/TE/S-16	South Wall	12	--
10 (EMC)	647/032294/TE/S-17	South Wall	12	--
11 (EMC)	647/032294/TE/S-18	West Wall	12	--
12 (EMC)	647/032294/TE/S-19	West Wall	12	--
13 (EMC)	647/032294/TE/S-20	West Wall	23	--
14 (EMC)	647/041194/TE/S-22	North Wall	24	--
15 (EMC)	647/041194/TE/S-23	North Wall	24	--
16 (EMC)	647/041194/TE/S-24	North Wall	24	--
17 (EMC)	647/041194/TE/S-25	North Wall	ND	--
18 (EMC)	647/041194/TE/S-26	North Wall	24	--
19 (EMC)	647/041194/TE/S-27	North Wall	ND	--
20 (EMC)	647/041194/TE/S-28	North Wall	ND	--
21 (EMC)	647/042694/TE/S-1	Pit Floor - Tank 1	24	19
22 (EMC)	647/042694/TE/S-2	Pit Floor - Tank 2	36	22
23 (EMC)	647/042694/TE/S-3	Pit Floor - Tank 3	24	21
24 (EMC)	647/042694/TE/S-4	Pit Floor - Tank 4	24	16
25 (EMC)	647/042694/TE/S-5	Pit Floor - Tank 5	48	22
26 (EMC)	647/042694/TE-S-6	Pit Floor - Tank 6	ND	17
27 (EMC)	647/042694/TE-S-7	Pit Floor - Tank 7	12	17
28 (EMC)	647/042694/TE-S-8	Pit Floor - Sludge Tank	ND	15
1 (PEER)	06-11-SS-EW-8	East Wall	9	--
2 (PEER)	06-11-SS-EW-10	East Wall	35	--
3 (PEER)	06-11-SS-NW-10	North Wall	8	--
4 (PEER)	06-11-SS-EW-12	East Wall	7	--
5 (PEER)	06-11-SS-SW-10	South Wall	10	--
6 (PEER)	06-11-SS-SW-09	South Wall	10	--
7 (PEER)	06-11-SS-SW-08	South Wall	10	--
8 (PEER)	06-11-SS-SWST-04	South Wall, Sludge Tank Pit	19	--
9 (PEER)	06-11-SW-10	South Wall	6	--
10 (PEER)	06-11-SS-SW-06	South Wall	19	--
11 (PEER)	06-11-SS-WW-12	West Wall	85	--
12 (PEER)	06-11-SS-22-12	West Wall	19	--
13 (PEER)	06-11-SS-WW-15	West Wall	45	--
14 (PEER)	06-SS-NW-15	North Wall	11	--
15 (PEER)	06-SS-NW-15	North Wall	7	--

Table 5.1 (Continued)
Closure Sampling Analytical Results
Old Petroleum, Oils, and Lubricants Facility (Site 11)
Birmingham International Airport
Birmingham, Alabama

Sample Locations No.	Field Sample No.	Sample Location	TPH Concentration (mg/kg)	Lead Concentration (mg/kg)
16 (PEER)	06-SS-NW-16	North Wall	7	--
17 (PEER)	06-SS-NW-15	North Wall	12	--
18 (PEER)	06-SS-NW-15	North Wall	13	--
19 (PEER)	06-SS-NW-15	North Wall	20	--
20 (PEER)	06-SS-NW-15	North Wall	13	--
21 (PEER)	06-11-SS-PF-20	Pit Floor - Tank 1	16	20
22 (PEER)	06-11-SS-PF-20	Pit Floor - Tank 2	25	22
23 (PEER)	06-11-SS-PF-20	Pit Floor - Tank 3	32	22
24 (PEER)	06-11-SS-PF-20	Pit Floor - Tank 4	12	16
25 (PEER)	06-11-SS-PF-20	Pit Floor - Tank 5	23	22
26 (PEER)	06-11-SS-PF-20	Fit Floor - Tank 6	11	18
27 (PEER)	06-11-SS-PF-20	Pit Floor - Tank 7	13	17
28 (PEER)	06-11-SS-PFST-06	Pit Floor - Sludge Tank	14	15
29 (PEER)	06-11-SS-WW-06	West Wall	12	--
30 (PEER)	06-11-SS-PF-10	Southwest Pit Floor	17	--
31 (PEER)	06-11-SS-PF-10	Southwest Pit Floor	17	--

ND = Not detected above method detection limit.
-- = Not analyzed.
Detection limit for EMC samples (EMC-1 through -28) is 10 mg/kg.
Detection limit for PEER samples (PEER-1 through -31) is 1 mg/kg.

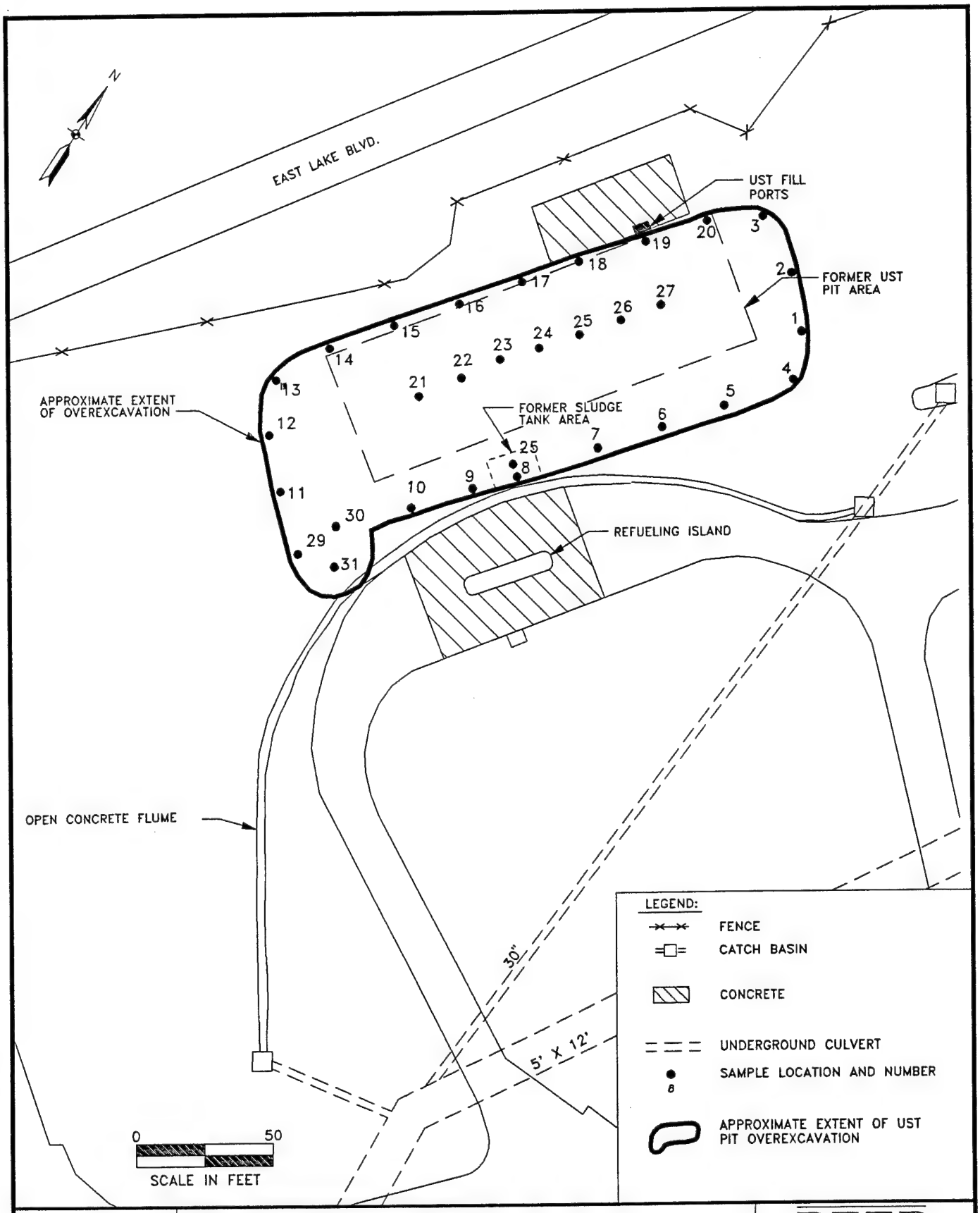

FIGURE 5.1

UST CLOSURE SAMPLE LOCATIONS

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BIRMINGHAM, ALABAMA

PEER

PROJ: 1566-016
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PEER Samples

A total of 29 soil samples (PEER-1 through -7, and PEER-9 through -30) were collected in the vicinity of the common tank pit on April 26 and 27 and May 19, 1994, by PEER. The samples were submitted to Stillbrook Laboratories of Birmingham, Alabama, for analysis. Samples collected beneath the locations of the former tanks were obtained after the concrete pad present in the pit was removed. The results indicated that no concentrations of TPH greater than the ADEM action limit of 100 mg/kg were found in the floor or side walls in the pit, and no concentrations of lead greater than the ADEM action limit of 100 mg/kg were found beneath the tanks. Analytical results of the side wall samples ranged from a low of 6 to a high of 85 mg/kg TPH, with an average concentration of 18 mg/kg TPH. The TPH analytical results of pit floor samples ranged from a low of 11 to a high of 32 mg/kg TPH, with an average concentration of 19 mg/kg TPH. The lead analytical results of the pit floor samples ranged from 16 mg/kg to a high of 22 mg/kg, with an average concentration of 20 mg/kg.

5.2 SLUDGE TANK PIT

Upon removal of the sludge tank from the common pit, a total of four samples were collected from the pit in the vicinity of the former 500-gal sludge tank. The portion of concrete pad which was located beneath the sludge tank was removed prior to collection of the samples. Two of the samples were collected by EMC and two were collected by PEER for independent confirmation. The samples were analyzed for TPH and lead using the same methods specified for the samples in the fuel tank pit. Analytical results are presented in Table 5.1, and sample locations are shown in Figure 5.1. The analytical results are discussed in the following paragraphs.

EMC Samples

EMC collected a total of two samples (EMC-8 and -28) in the vicinity of the former sludge tank on March 22, 1994, and April 26, 1994, respectively. The side wall sample contained a concentration of TPH at 23 mg/kg. The pit floor sample obtained beneath the former location of the sludge tank did not contain TPH in detectable concentrations, and lead was detected at a

concentration of 15 mg/kg. Several other metals were detected in the soil sample from beneath the former sludge tank at levels ranging from 17 mg/kg (arsenic) to 20 mg/kg (chromium). The remainder of the metals results are provided in the Corrective Action Report (H&M 1995).

PEER Samples

Two soil samples (8 and 28) were collected on April 26, 1994, from the vicinity of the former sludge tank from the common pit. The samples were analyzed as discussed in Section 5.1. One of the sludge tank pit soil samples was collected from the pit floor in an area formerly beneath the sludge tank, and the second sample was collected from the former south wall of the sludge tank pit. Sample locations are shown on Figure 5.1. Analytical results are presented in Table 5.1. Sample 8 (south wall) contained a concentration of 19 mg/kg TPH. The pit floor sample (28) obtained beneath the former location of the sludge tank contained 14 mg/kg TPH and lead at a concentration of 15 mg/kg.

5.3 OVEREXCAVATED AREA

Several rounds of soil samples were collected by EMC from the overexcavated area around the UST pit and submitted to EMC Laboratory for analysis of TPH. The samples were collected and analyzed to determine the necessity and extent of additional excavation of contaminated soils in the initial sampling rounds, and to confirm that soils at the boundaries of the excavation contained TPH concentrations below the ADEM limit of 100 mg/kg in the final sampling rounds. This section discusses the final rounds of soil sample collection which demonstrate that the TPH concentrations in the side walls and floor of the overexcavated areas were below the ADEM limit.

Ninety-nine samples (S-29 through S-127) were obtained from the overexcavated area outside the UST pit. The samples were collected from May 18, 1994, through December 21, 1994, during the ongoing excavation activities. The analytical results obtained from the final rounds of sampling in the overexcavated areas are provided in Table 5.2, and the sample locations are shown in Figure 5.2. Analytical results for TPH in the samples collected ranged from not

Table 5.2
Overexcavated Area Sampling Analytical Results
Old Petroleum, Oils, and Lubricants Facility (Site 11)
Birmingham International Airport
Birmingham, Alabama

Item No.	Field Sample No.	Sample Location	TPH Concentration (mg/kg)
S-29	647/122194/S/W-5	Overexcavation Wall	11
S-30	647/122194/S/W-4	Overexcavation Wall	11
S-31	647/122194/S/W-3	Overexcavation Wall	44
S-32	647/122194/S/W-4	Overexcavation Wall	ND
S-33	647/122194/S/W-1	Overexcavation Wall	ND
S-34	647/112194/OEW/S-5	Overexcavation Wall	11
S-35	647/112194/OEW/S-4	Overexcavation Wall	11
S-36	647/112194/OEW/S-3	Overexcavation Wall	ND
S-37	647/112194/OEW/S-2	Overexcavation Wall	ND
S-38	647/112194/OEW/S-1	Overexcavation Wall	11
S-39	647/122094/OEW/S-1	Overexcavation Wall	ND
S-40	647/110394/OEW/S-1	Overexcavation Wall	ND
S-41	647/110394/OEW/S-2	Overexcavation Wall	11
S-42	647/110394/OEW/S-3	Overexcavation Wall	22
S-43	647/110394/OEW/S-4	Overexcavation Wall	ND
S-44	647/110394/OEW/S-S	Overexcavation Wall	ND
S-45	647/100694/OEW/S-4	Overexcavation Wall	12
S-46	647/100694/OEW/S-5	Overexcavation Wall	ND
S-47	647/100694/OEW/S-6	Overexcavation Wall	ND
S-48	647/100694/OEW/S-7	Overexcavation Wall	24
S-49	647/100694/OEW/S-8	Overexcavation Wall	ND
S-50	647/100594/OEW/S-8	Overexcavation Wall	46
S-51	647/100594/OEW/S-7	Overexcavation Wall	23
S-52	647/122194/S/F-5	Overexcavation Floor	ND
S-53	647/122194/S-F-4	Overexcavation Floor	ND
S-54	647/122194/S/F-3	Overexcavation Floor	ND
S-55	647/122194/S/F-2	Overexcavation Floor	11
S-56	647/122194/S/F-1	Overexcavation Floor	11
S-57	647/122094/OEB/S-1	Overexcavation Floor	11
S-58	647/122194/OEB/S-3	Overexcavation Floor	22
S-59	647/112194/OEB/S-1	Overexcavation Floor	11
S-60	647/110394/OEB-S-7	Overexcavation Floor	ND
S-61	647/110394/OEB-S-8	Overexcavation Floor	11
S-62	647/110394/OEB-S-9	Overexcavation Floor	ND
S-63	647/110394/OEB-S-10	Overexcavation Floor	ND
S-64	647/110394/OEB-S-11	Overexcavation Floor	ND
S-65	647/110394/OEB-S-12	Overexcavation Floor	ND
S-66	647/110394/OEB-S-13	Overexcavation Floor	ND
S-67	647/110394/OEB-S-14	Overexcavation Floor	ND
S-68	647/110394/OEB-S-15	Overexcavation Floor	ND
S-69	647/110394/OEB-S-16	Overexcavation Floor	33
S-70	647/110394/OEB-S-19	Overexcavation Floor	11
S-71	647/110394/OEB-S-20	Overexcavation Floor	22

Table 5.2
Overexcavated Area Sampling Analytical Results
Old Petroleum, Oils, and Lubricants Facility (Site 11)
Birmingham International Airport
Birmingham, Alabama

Item No.	Field Sample No.	Sample Location	TPH Concentration (mg/kg)
S-72	647/110394/OEB-S-21	Overexcavation Floor	89
S-73	647/110394/OEB/S-23	Overexcavation Floor	78
S-74	647/100694/OEB/S-11	Overexcavation Floor	ND
S-75	647/100694/OEB/S-12	Overexcavation Floor	11
S-76	647/100694/OEB/S-13	Overexcavation Floor	ND
S-77	647/100694/OEB/S-14	Overexcavation Floor	11
S-78	647/100694/OEB/S-15	Overexcavation Floor	ND
S-79	647/100694/OEB/S-16	Overexcavation Floor	ND
S-80	647/100694/OEB/S-17	Overexcavation Floor	ND
S-81	647/100694/OEB/S-18	Overexcavation Floor	ND
S-82	647/100694/OEB/S-19	Overexcavation Floor	ND
S-83	647/100694/OEB/S-20	Overexcavation Floor	ND
S-84	647/100694/OEB/S-21	Overexcavation Floor	ND
S-85	647/100694/OEB/S-22	Overexcavation Floor	ND
S-86	647/100694/OEB/S-23	Overexcavation Floor	ND
S-87	647/100594/OE/S-31	Overexcavation Floor	34
S-88	647/100594/OE/S-29	Overexcavation Floor	34
S-89	647/100594/OE/S-28	Overexcavation Floor	23
S-90	647/100594/OE/S-22	Overexcavation Floor	46
S-91	647/100594/OE/S-3	Overexcavation Floor	11
S-92	647/100594/OE/S-2	Overexcavation Floor	ND
S-93	647/100594/OE/S-1	Overexcavation Floor	ND
S-94	647/100594/OEB/S-1	Overexcavation Floor	11
S-95	647/100594/OEB/S-3	Overexcavation Floor	23
S-96	647/100594/OEB/S-4	Overexcavation Floor	11
S-97	647/100594/OEB/S-5	Overexcavation Floor	23
S-98	647/100594/OEB/S-6	Overexcavation Floor	11
S-99	647/100594/OEB/S-9	Overexcavation Floor	34
S-100	647/100594/OEB/S-10	Overexcavation Floor	11
S-101	647/052694/OE/S-1	Overexcavation Floor	ND
S-102	647/052694/OE/S-2	Overexcavation Floor	12
S-103	647/052694/OE/S-3	Overexcavation Floor	ND
S-104	647/052694/OE/S-56	Overexcavation Floor	48
S-105	647/052694/OE/S-57	Overexcavation Floor	60
S-106	647/052694/OE/S-12	Overexcavation Floor	ND
S-107	647/052694/OE/S-13	Overexcavation Floor	24
S-108	647/052694/OE/S-28	Overexcavation Floor	ND
S-109	647/052694/OE/S-29	Overexcavation Floor	24
S-110	647/051994/OE/S-30	Overexcavation Floor	ND
S-111	647/051994/OE/S-31	Overexcavation Floor	ND
S-112	647/051994/OE/S-32	Overexcavation Floor	ND
S-113	647/051994/OE/S-33	Overexcavation Floor	ND
S-114	647/051994/OE/S-34	Overexcavation Floor	ND
S-115	647/051994/OE/S-35	Overexcavation Floor	ND

Table 5.2
Overexcavated Area Sampling Analytical Results
Old Petroleum, Oils, and Lubricants Facility (Site 11)
Birmingham International Airport
Birmingham, Alabama

Item No.	Field Sample No.	Sample Location	TPH Concentration (mg/kg)
S-116	647/051894/OE/S-4	Overexcavation Floor	12
S-117	647/051894/OE/S-5	Overexcavation Floor	84
S-118	647/051894/OE/S-6	Overexcavation Floor	ND
S-119	647/051894/OE/S-7	Overexcavation Floor	ND
S-120	647/051894/OE/S-8	Overexcavation Floor	ND
S-121	647/051894/OE/S-9	Overexcavation Floor	ND
S-122	647/051894/OE/S-10	Overexcavation Floor	ND
S-123	647/051894/OE/S-11	Overexcavation Floor	ND
S-124	647/051894/OE/S-14	Overexcavation Floor	ND
S-125	647/051894/OE/S-25	Overexcavation Floor	ND
S-126	647/051894/OE/S-26	Overexcavation Floor	ND
S-127	647/051894/OE/S-27	Overexcavation Floor	48

ND = Not detected above method detection limits.

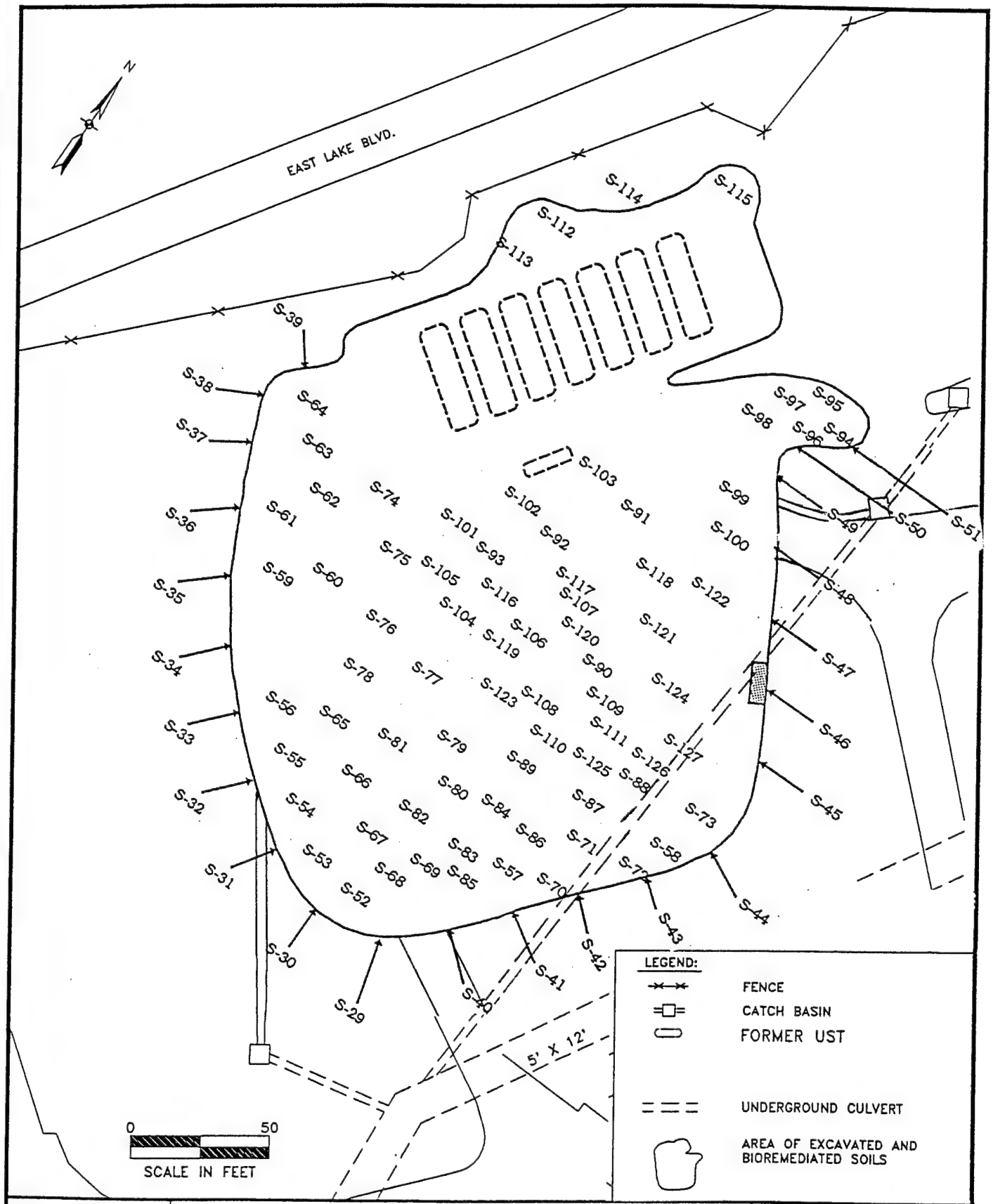

FIGURE 5.2

OVEREXCAVATED AREA FINAL SAMPLE LOCATIONS

ALABAMA AIR NATIONAL GUARD
BIRMINGHAM, ALABAMA

PEER

PROJ: 1566-016
FILE: AANG001D.DWG

detected to 88 mg/kg TPH. The average detected concentration of TPH in the overexcavated areas was approximately 25 mg/kg.

5.4 BIO-CELLS

Several rounds of samples were collected by EMC from the bio-cells during the site activities. The samples were collected to determine concentrations of TPH in the soils prior to treatment. One soil sample was collected for each 20 yd^3 of soil stockpiled in the bio-cells and submitted to EMC laboratory for analysis for TPH. Analytical laboratory data for soil samples obtained from the bio-cells are provided in the Corrective Action Report (EMC 1995). Analytical results for these samples ranged from not detected to 2,400 mg/kg TPH. Soils with concentrations above 100 mg/kg were mixed together with the soils containing concentrations below the ADEM action limit and were treated as discussed in Section 4.2.

5.5 SOIL PILES

To test the effectiveness of the soil treatment, EMC obtained a total of 20 randomly collected composite samples from the soil stockpile and submitted them to the laboratory for analysis of TPH. The samples were collected during two separate events on May 16, 1994, when the soil stockpile was composed of 6,800 yd^3 of treated soil, and on July 26, 1994, when the stockpile contained an additional 1,500 yd^3 of treated soil (first change order). The analytical results obtained from each of the two separate events indicated that TPH concentrations in the soil stockpile were below the ADEM limit of 100 mg/kg. The ten samples collected in May contained TPH in concentrations ranging from 12 to 72 mg/kg, and the ten samples collected in July ranged from 24 to 96 mg/kg. Based on the analytical results, the ANG determined that further treatment of soils would not be necessary after the bioremediation conducted in the bio-cells, and that the in-situ bioremediation system would not be constructed.

Under the second and third change orders, an additional 5,000 and 4,200 yd^3 of soil was excavated, respectively. The additional 9,200 yd^3 soil made a larger area necessary for stockpiling of the soils. Consequently, the ANG made the decision to move the soil stockpile from the vicinity of the site to a parking area west of the Communications Building (Building 301). A total

of 74 composite samples were collected from the stockpile by EMC and PEER during its transfer to the vicinity of Building 301. The stockpiled soil was transferred to the parking area in approximately 14 yd^3 loads. Prior to loading on the dump trucks, the soils were placed in seven piles of approximately 2 yd^3 each. Five grab samples were collected from each of the seven piles for a total of 35 grab samples. The 35 grab samples were then composited into a single sample and submitted to a laboratory for analysis of TPH. The composite samples were termed "clearance samples." If any clearance sample contained a TPH concentration above the ADEM action limit of 100 mg/kg, the soil it represented was moved to a bio-cell for further treatment. If any clearance sample contained an elevated concentration of TPH (32 mg/kg or higher), then a discrete sample was collected from each of the seven piles and submitted to a laboratory for analysis in order to isolate the soil pile with the elevated TPH concentration. If any discrete sample contained a TPH concentration above the ADEM action limit, the soil from that particular pile also was moved to a bio-cell for further treatment. Based on the analytical results of the composite samples which ranged from not detected to 190 mg/kg TPH, approximately 300 yd^3 of soil were placed in a bio-cell for further treatment. By September 8, 1994, the soil stockpile was completely removed from the vicinity of the site and hauled to the parking area at Building 301.

The stockpiled soils were used as fill in the UST pit and the overexcavated areas. Currently, the remaining treated soils are still stockpiled in the vicinity of Building 301. However, the treated soils are being used as fill for different on-base construction projects on an as needed basis.

5.6 GROUNDWATER

In September and October 1996, Birmingham Engineering & Construction Consultants installed four new groundwater monitoring wells in the vicinity of Site 11. The groundwater wells were installed in order to evaluate the effectiveness of the cleanup activities conducted at the site as previously described. Groundwater well MW-2 was installed topographically and hydraulically upgradient of the former UST pit as shown on Figure 5.3. The remaining three wells (MW-3, MW-4, and MW-5) were installed topographically and hydraulically downgradient of the former UST pit as shown on Figure 5.3. Groundwater wells MW-3, MW-4, and MW-5 were installed in borings of approximately 19 ft BGS, and water was encountered in each of the borings at around 17 to 18 ft BGS. Groundwater well MW-2 was installed in a boring of 38 ft BGS, and water was

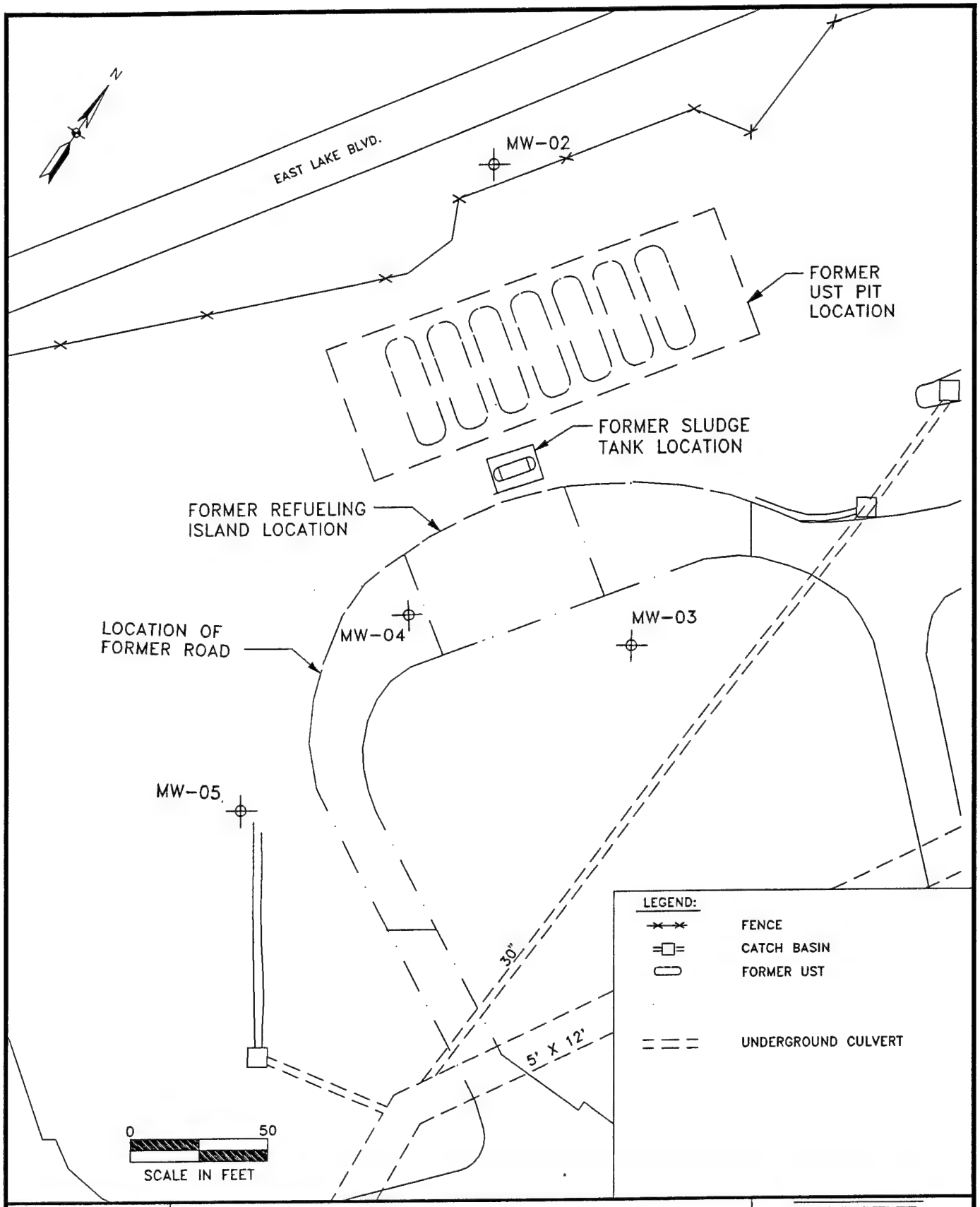

FIGURE 5.3

NEW MONITORING WELL LOCATIONS
ALABAMA AIR NATIONAL GUARD
BIRMINGHAM, ALABAMA

PEER
PROJ: 1566-016
FILE: AANG001C.DWG

encountered at approximately 35 ft BGS. Boring logs and well installation information are provided in Appendix F.

Groundwater samples were collected from each of the wells on October 2, 1996 (MW-4), and October 3, 1996 (MW-2, MW-3, and MW-5). The wells were sampled for PAHs by EPA Method 610, and for volatile organic compounds by EPA Method 624. The samples were analyzed by Environmental Service Laboratories of Birmingham, Alabama. The analytical results are provided in Table 5.3. The analytical laboratory reports are provided in Appendix E. No volatile organic compounds or PAHs were detected above the method detection limits in the groundwater samples collected from the site. Additionally, no free product was observed in any of the newly installed wells.

5.7 QUALITY ASSURANCE/QUALITY CONTROL

Duplicate soil samples were collected at a rate of 10% during the sampling activities. A total of 157 duplicate soil samples were collected during the soil sampling activities. Thirty-four of the duplicates were collected from the UST pit as confirmatory soil samples and are discussed in Section 5.1. The analytical results for the remaining duplicates and the corresponding original soil samples are provided in Table 5.4. Analytical laboratory reports for the quality assurance/quality control samples are provided in the Corrective Action Report (EMC 1995).

Table 5.3
New Monitoring Well Analytical Results
Old Petroleum, Oils, and Lubricants Facility (Site 11)
Birmingham International Airport
Birmingham, Alabama

Parameter	Analytical Results (µg/L)				
	Detection Limits (µg/L)	MW-02 (10/2/96)	MW-03 (10/3/96)	MW-04 (10/3/96)	MW-05 (10/3/96
Volatile Organic Compounds					
Benzene	5.0	ND	ND	ND	ND
Toluene	5.0	ND	ND	ND	ND
Ethylbenzene	10.0	ND	ND	ND	ND
Xylenes, Total	10.0	ND	ND	ND	ND
Semivolatile Organic Compounds					
Acenaphthene	2.0	ND	ND	ND	ND
Acenaphthylene	4.0	ND	ND	ND	ND
Anthracene	2.0	ND	ND	ND	ND
Benzo(a)anthracene	8.0	ND	ND	ND	ND
Benzo(a)pyrene	3.0	ND	ND	ND	ND
Benzo(b)fluoranthene	5.0	ND	ND	ND	ND
Benzo(g,h,i)perylene	5.0	ND	ND	ND	ND
Benzo(k)fluoranthene	3.0	ND	ND	ND	ND
Chrysene	3.0	ND	ND	ND	ND
Dibenzo(a,h)anthracene	3.0	ND	ND	ND	ND
Fluoranthene	3.0	ND	ND	ND	ND
Fluorene	2.0	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	4.0	ND	ND	ND	ND
Naphthalene	2.0	ND	ND	ND	ND
Phenanthrene	6.0	ND	ND	ND	ND
Pyrene	2.0	ND	ND	ND	ND
2-Methylnaphthalene	10	ND	ND	ND	ND
1-Methylnaphthalene	10	ND	ND	ND	ND

ND = Not detected above method detection limits.

Table 5.4
Quality Assurance/Quality Control Analytical Results
Old Petroleum, Oils, and Lubricants Facility (Site 11)
Birmingham International Airport
Birmingham, Alabama

Sample Location/ID	Sample Date	Duplicate Sample TPH Concentration (mg/kg)	Original Sample TPH Concentration (mg/kg)
SP/S-1	2/16/94	280	25
SP/S-1	2/17/94	220	260
SP/S-3	2/18/94	700	260
SP/S-1	2/18/94	140	12
SP/S-3	2/27/94	150	37
SP/S-13	2/27/94	2,600	260
SP/S-3	2/27/94	130	37
SP/S-13	2/27/94	52	260
SP/S-8	3/6/94	190	ND
SP/S-8	3/6/94	15	ND
SP/S-3	3/7/94	87	37
SP/S-3	3/7/94	ND	13
SP/S-1	3/14/94	120	82
SP/S-11	3/14/94	26	12
SP/S-21	3/14/94	500	290
SP-S-31	3/14/94	19	36
SP/S-4	3/17/94	400	97
SP/S-1	3/20/94	150	300
SP/S-11	3/20/94	1,280	35
TE/S-3	3/22/94	3,380	890
TE/S-11	3/22/94	44	ND
SP/S-10	4/4/94	96	48
TE/S-25	4/11/94	77	ND
SP3/S-10	4/16/94	1,900	95
SP3/S-20	4/16/94	63	ND
SP2/S-10	4/19/94	55	24
SP2/S-20	4/19/94	55	12
CS/S-3	4/26/94	200	48
SP1/S-10	4/29/94	110	47
SP1/S-20	4/29/94	680	210
SP2/S-7	4/29/94	330	480
SP2/S-15	4/29/94	260	260
SP2/S-8	4/29/94	100	180
SP2/S-1	5/14/94	300	190
SP2/S-11	5/14/94	140	60
SP1/S-1	5/16/94	86	72
SP1/S-10	5/16/94	79	24
SP1-S-25	5/16/94	130	190
TS/S-10	5/16/94	74	12
OE/S-10	5/18/94	120	ND
OE/S-20	5/18/94	63	ND
OE/S-30	5/19/94	56	ND

Table 5.4 (Continued)
Quality Assurance/Quality Control Analytical Results
Old Petroleum, Oils, and Lubricants Facility (Site 11)
Birmingham International Airport
Birmingham, Alabama

Sample Location/ID	Sample Date	Duplicate Sample TPH Concentration (mg/kg)	Original Sample TPH Concentration (mg/kg)
OE/S-35	5/19/94	45	ND
SP/S-10	5/26/94	180	48
SP/S-20	5/26/94	150	48
T1/S-5	5/26/94	120	120
OE/S-12	5/26/94	83	ND
OE/S-54	5/26/94	220	1,160
T3/S-2	5/27/94	290	140
T5/S-1	5/27/94	57	140
SP/S-10	6/3/94	190	96
SP/S-20	6/3/94	141	36
SP/S-30	6/3/94	97	24
SP/S-40	6/3/94	72	71
SP/S-50	6/3/94	99	47
SP/S54	6/3/94	98	84
SPF-6/DS-1	8/2/94	65	36
SPF-7/DS-1	8/2/94	73	12
SPL/CS-1	8/3/94	85	48
SP2X/CS-1	8/9/94	43	36
SP2K-1/DS-1	8/9/94	180	84
SP2N-4/DS-1	8/9/94	140	160
SP2P-7/DS-1	8/10/94	120	36
SP3H-2/DS-1	8/17/94	36	24
SP/S-1	8/24/94	55	36
SP/S-11	8/25/94	98	36
SP/S-21	8/25/94	23	12
SP/S-31	8/26/94	99	60
SP/S-41	8/26/94	50	24
SP/S-61	8/26/94	47	60
SP/S-71	8/26/94	43	48
SP/S-52	8/27/94	58	190
SP/S-82	8/27/94	75	48
SP/S-115	9/9/94	12	12
SP/S-134	9/9/94	42	12
SP/S-9	9/15/94	41	24
SP/S-145	9/15/94	720	1,510
SP/S-150	9/15/94	66	24
SP/S-155	9/15/94	180	190
SP/S-166	9/15/94	50	48
SP/S-139	9/15/94	140	60
SP/S-152	9/15/94	21	ND
SP/S-160	9/15/94	36	ND
SP/S-169	9/19/94	10	10
SP/S-174	9/19/94	43	30

Table 5.4 (Continued)
Quality Assurance/Quality Control Analytical Results
Old Petroleum, Oils, and Lubricants Facility (Site 11)
Birmingham International Airport
Birmingham, Alabama

Sample Location/ID	Sample Date	Duplicate Sample TPH Concentration (mg/kg)	Original Sample TPH Concentration (mg/kg)
SP/S-184	9/19/94	66	80
SP/S-194	9/19/94	22	10
SP/S-201	9/19/94	12	10
CL5	9/26/94	18	23
SP/S-276	10/27/94	9	ND
SP/S-280	10/27/94	18	23
SP/S-282	10/27/94	12	ND
SP/S-284	10/27/94	8	ND
SP/S-288	10/27/94	12	ND
SP/S-292	10/27/94	8	ND
SP/S-296	10/27/94	15	12
SP/S-300	10/27/94	29	23
SP/D-2	10/28/94	7	ND
SP/D-6	10/28/94	7	23
SP/CL-11	10/27/94	12	23
SP/CL-3	10/28/94	9	11
SP/CL-4	10/28/94	67	45
SP/CL-7	10/28/94	16	23
SP/S-305	10/28/94	85	33
SP/S-309	10/28/94	46	100
SP/S-313	10/29/94	43	57
SP/S-318	10/28/94	16	34
SP/S-319	11/1/94	19	33
SP/S-328	11/1/94	9	22
SP/S-337	11/1/94	12	44
SP/S-346	11/1/94	16	67
SP/S-352	11/1/94	4	22
SP/S-354	11/3/94	3	11
OEW/S-1	11/3/94	4	ND
OEB/S-10	11/3/94	10	ND
OEB/S-19	11/3/94	12	11
SP/S-371	11/14/94	ND	ND
SP/S-380	11/14/94	ND	ND
SP/S-389	11/14/94	ND	ND
SP/S-398	11/14/94	ND	ND
OEW/S-6	11/21/94	65	260
CL-8	11/21/94	ND	ND
SP/S-409	11/21/94	17	ND

ND = Not detected above method detection limits.

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6.0 CONCLUSIONS

Seven 25,000-gal USTs, and a 500-gal sludge tank, piping, and associated appurtenances were removed from the site. The seven 25,000-gal USTs were cut up at the contractor's scrap yard, and the associated piping and debris were disposed of at Mindis Recycling. Approximately 17,500 yd^3 of TPH-contaminated soil was excavated from the UST pit and adjacent areas and bioremediated. Over 1,300 soil samples and 4 groundwater samples were collected during the remedial action and closure activities.

The remedial activities at Site 11 are complete for petroleum products, and no further collection or analysis of soil samples will be required based on the following:

- the source of petroleum contamination (the USTs and the sludge tank) at Site 11 has been removed;
- the associated contaminated soils have been excavated and bioremediated below the ADEM action limit of 100 mg/kg;
- the monitoring wells containing free product and their surrounding soils have been excavated and removed during the overexcavation activities, and the soils have been bioremediated;
- the analytical results from the 161 soil samples obtained during the final sampling rounds in the UST pit and overexcavated area were below the ADEM action limit; and
- no petroleum-related contaminants (BTEX and PAHs) are present in site groundwater based on sampling results from the four recently installed wells.

ADEM requirements specify that a round of groundwater levels be collected from the four recently installed monitoring wells. Several rounds of groundwater levels were collected during the SA (PEER 1992) from previously installed wells at the site. Excavation activities extended

below the groundwater table. The last round of water levels obtained during the SA are included in Table 6.1.

During an RI planned for three other sites, an additional monitoring well will be installed hydraulically downgradient from the original extent of soil contamination at this site. Groundwater level measurements will be obtained and groundwater samples will be collected from the one proposed and four existing monitoring wells.

Table 6.1
Site Assessment Groundwater Elevations - Final Round
Old Petroleum, Oils, and Lubricants Facility (Site 11)
Birmingham International Airport
Birmingham, Alabama

Monitoring Well	Screened Interval (ft BGS)	Top of Casing Elevation (ft above MSL)	Groundwater Elevation 12/23/91 (ft above MSL)
MW-01	6 - 21	640.15	627.04
MW-02	2 - 7	626.58	624.56
MW-03	2 - 7	622.73	621.22
MW-04	3 - 8	632.08	629.20
MW-05	34 - 49	640.36	620.85
MW-06	23 - 28	624.83	608.73
MW-07	11 - 16	621.19	608.88
MW-08	2 - 7	615.32	608.81
MW-09	6.5 - 11.5	616.14	607.95
MW-10	1 - 21	626.02	605.70
MW-11	1 - 21	623.84	606.18
MW-12	3 - 18	621.40	606.62
MW-13	1.5 - 21	623.22	607.09
MW-14	1.5 - 16.5	617.35	609.12
MW-15	1 - 6	621.24	620.75
MW-A	*(1)	629.59	627.83
MW-B	*	630.11	627.86
MW-C	*	629.39	625.72
MW-D	*	630.72	628.22
MW-E	*	632.11	628.15
MW-F	*	630.23	627.82
MW-G	*	629.76	626.98
DW-01	32 - 42	627.12	609.61

(1)* Screened interval not known; however, wells appear to be screened to ground surface.
MSL Main sea level.

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7.0 REFERENCES

Environmental-Materials Consultants, Inc., "Corrective Action Report for the Alabama Air National Guard, 117th Reconnaissance Wing, Old POL Facility, Jefferson County, Birmingham, Alabama," 1995.

Environmental-Materials Consultants, Inc., "Closure Assessment Report for the Alabama Air National Guard, 117th Reconnaissance Wing, Old POL Facility, Jefferson County, Birmingham, Alabama," 1994.

PEER Consultants, P.C., "Draft Underground Storage Tank Closure Assessment and Corrective Action Oversight Work Plan, Old POL Facility, 117th Tactical Reconnaissance Wing, Alabama Air National Guard Base, Birmingham Municipal Airport, Birmingham, Alabama," 1994.

PEER Consultants, P.C., "Final Site Assessment Report and Corrective Action Plan for the Old POL Facility, 117th Tactical Reconnaissance Wing, Alabama Air National Guard Base, Birmingham Municipal Airport, Birmingham, Alabama," 1992.

CH2M Hill, "Site Investigation Report, 117th Tactical Reconnaissance Wing, Alabama Air National Guard, Army Aviation Support Facility, Birmingham, Municipal Airport," 1991.

Law Engineering, "Report of Subsurface Exploration, Alabama National Guard POL Complex," 1989.

Law Engineering, "Report of Soil Contamination Assessment, Alabama Air National Guard POL Complex," 1988.

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APPENDIX A
H&M, INC., TECHNICAL PROPOSAL FOR REMEDIAL ACTION ACTIVITIES (ABBREVIATED VERSION)

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H & M Associates, Inc. Proposal

TABLE OF CONTENTS

DAHA01 93 C 0012

PROJECT TITLE/NUMBER: BRKR 937015R - Removal of Contaminated Soil and Removal of Jet Fuel Tanks Birmingham Airport, (ANG) Birmingham, AL

PLAN FOR UST
REMOVAL AND DISPOSAL

All work related to the removal of UST's and related piping will be done in compliance with ADEM requirements. Notifications will be sent to ADEM before work begins and the closure assessment will be submitted by Environmental Materials Consultants as discussed in the section on Bio-Remediation. EMC shall also be responsible for all testing of the soil as required by ADEM. All fuels in the tanks and piping will be removed and recycled. Any remaining sludge in the tanks shall be removed and tested for Hazardous characteristics. This sludge shall be disposed of in a landfill which is permitted to accept this waste. We will not know which landfill to use until the TCLP results are received. The tanks will then be made vapor free and transported off-site to be cut up for salvage. All concrete shall be removed and disposed of in the local landfill. The following requirements shall be met for this work.

A. Make all notification and obtain all permits required for this work by the Birmingham Fire Marshal, the Alabama Department of Environmental Management and other local, state or federal agencies.

B. Remove and dispose of the tanks and piping in accordance with the procedures set forth in the second edition of the American Petroleum Institute, Recommended Practice 1604 entitled "Removal and Disposal of the used Underground Petroleum Storage Tanks" and applicable ADEM and municipal regulations. Prior to disposal the tanks are to be cleaned in accordance with API publication 2015, third edition, Cleaning Petroleum Storage Tanks.

C. During the preparation for the removal of the tank and piping the contractor will maintain onsite.

   1. A superintendent that is thoroughly familiar with API Recommended Practice 1604.

   2. A copy of API Recommended Practice 1604.

   3. A combustible gas indicator

   4. Other required safety equipment/supplies

Any water found in the tanks shall be collected and analyzed for hazardous characteristics. It shall then be transported to a facility which is permitted to treat it. The excavation shall be bermed to prevent any runoff from entering the pit. Due to the size of the excavation, it is impractical to cover the pit. Any rain which collects in the pit shall be pumped out and analyzed. It shall then be disposed of as required, or used to bring up the moisture level in the contaminated soil if needed.

Groundwater Remediation is not a part of this contract. Should contaminated groundwater be encountered during excavation, we shall immediately notify the contracting officer for direction.

IN-SITU BIO-REMEDIATION AND TESTING
ALABAMA AIR NATIONAL GUARD FACILITY
BIRMINGHAM, ALABAMA
SOL# DAHA01-93-R-0004

SAMPLING PLAN

(1) CLOSURE SAMPLING

Soil samples will be collected and analyzed for total petroleum hydrocarbons (TPH) from the tank and piping excavations and stockpiled soil. These samples will be collected according to the Alabama Department of Environmental Management (ADEM) Guidelines. Wall samples will be collected from the bottom one third of the excavation. One wall sample will be collected for every twenty-five feet of tank excavation wall. A minimum of one sample will be collected from the excavation bottom for each tank removed. Pipe trench samples will be collected from the bottom of the trench at a frequency of one sample for each ten feet of trench. Stockpiled soil samples will be collected from soil removed from around the tanks at a frequency of one sample for each twenty cubic yards of soil removed. Each stockpiled soil sample will be a composite of a minimum of five random grab samples.

(2) OVER EXCAVATION OF TANK AND PIPE EXCAVATIONS

If analytical results indicate that the walls and/or base of the initial excavations are contaminated, the contractor will remove

additional soil from the contaminated areas and the same sampling procedures used in the closure sampling will be repeated in those areas.

(3) EXCAVATED AREAS OUTSIDE OF TANK EXCAVATION

Where areas are excavated outside of the tank excavation area soil samples will be collected and analyzed for TPH. One sample for every twenty five feet of wall. These samples will be comprised of grab samples collected and composited along the wall. The bottom of the excavation will be sampled by collecting five grab samples and compositing them for every four hundred square feet of bottom. The stockpiled soil from this area will be sampled by collecting five grab samples and compositing them for every twenty yards of soil removed. If analytical results indicate that contamination still exist the contractor will remove more soil from the contaminated areas and the sampling procedure will be repeated. An additional ten samples will be collected from all of the contaminated soil that has been removed and analyzed for total lead utilizing EPA Method 239.2.

(4) SAMPLING PROTOCOL

All samples will be collected and preserved according to EPA and ADEM guidelines. Soil samples will be collected in pre-cleaned and assembled glass jars with Teflon lined lids. All sampling devices will be decontaminated between samples to prevent cross

contamination of samples. Each sample will be labeled with a sample identification label designating date and time sampled, sample location, who collected sample, and sample identification number. A Chain of Custody will be maintained on each sample, tracking it from sample location to the laboratory. (Samples, See Figure 2)

CLOSURE ASSESSMENT REPORT

An ADEM Closure Assessment Report (Form WP+ 1538) will be completed for each tank excavation. Included with this form will be (1) site drawings showing locations of tanks and piping, (2) sampling drawings showing sample locations, and (3) site orientation maps. Analytical results along with their Chain of Custody and field notes will also be included with this report. (See Figure 1 - 3 for examples). An excavation and soil disposition report will be enclosed with the closure assessment report.

BIO REMEDIATION DESIGN

As contaminated soil is removed from the excavation it will be stockpiled in the designated staging area. Each twenty cubic yards of soil will be sampled and analyzed for total petroleum hydrocarbons (TPH). The stockpiled soil will be placed in a wooden form that has been designed to contain a specific volume of soil. While in the form each batch of soil will be treated with Hydrobac S; a mixture of aerobic and anaerobic bacteria especially blended for degrading petroleum hydrocarbons. This bacteria

will be added in a quantity of 0.3 pounds per cubic yard of contaminated soil. Nutrients in the form of Nitrogen and Phosphorus in a 5 : 1 ratio will be added to each batch at a rate of 0.65 pounds per cubic yard of contaminated soil. The emulsifier, PolyBac E, will be added at a rate of 0.07 pounds per cubic yard of contaminated soil. Water will be added until the moisture content of the soil is between 15 and 20 percent. Once all materials have been spread evenly over the formed soil, it will be blended thoroughly using mechanical tillers. After a batch of the soil/bacteria/nutrient mixture has been blended it will be removed from the form and stockpiled. this process will be repeated until all of the contaminated soil has been treated. When the soil is removed from the forms it will be stockpiled according to TPH concentrations. Once all the soil has been treated it will be blended together to end up with 6,800 yards of contaminated soil with approximately the same TPH concentrations throughout.

When the tanks are removed and excavation is completed, the tank excavation will be lined with a 10 mil minimum thickness, reinforced polyethylene liner. This liner will segregate the "clean" soils of the excavation walls and base from the in situ remediation system that will be constructed in the excavation. This system will be constructed in the following manner:

(1) All soil will have been treated as previously described.

(2) Just prior to being placed into the lined cell all soil will be reblended using mechanical tillers and its moisture content adjusted to approximately 20 percent.

(3) Three to five feet of treated soil will be placed in the bottom of the lined cell.

(4) An infiltration gallery will be placed into the excavation. This gallery will be made up of four inch slotted PVC piping placed horizontally on two foot centers for the length of the excavation. This piping will be manifold together on one end with a stand pipe to the ground surface. Once the infiltration gallery is in place the rest of the treated soil will be placed in the cell. A second infiltration gallery constructed in the same manner as the first will be placed on top of the contaminated soil. The contaminated soil will then be covered with reinforced poly sheeting to prevent surface waters from infiltrating the cell. The liner will be covered with a minimum of twelve inches of top soil and the area will be seeded to prevent FOD problems. (See Figures 4 & 5)

SAMPLING OF IN SITU SOIL REMEDIATION

After all of the contaminated soil has been treated, blended and placed back into the lined excavation, a grid will be designed which divides the excavation into fifty cubic yard sections. These sections will be marked off and given a location number. (See Figure 6 for example).

Sixty days from the date in situ biodegradation began, twenty random hand augered borings will be placed in ten sections, two per section. Five grab samples from different depths in each boring will be collected. All ten grab samples from each section will be composited into one

sample and analyzed for TPH. A total of ten random composite samples will be tested.

If analytical results indicate that the ten random samples are less than 100 ppm TPH the remaining sections will be tested in the same manner. If analytical results indicate that petroleum contamination greater than 100 ppm still exist, a nitrate solution will be added through the infiltration system. The concentration of the nitrate water solution and the quantity will depend on the remaining hydrocarbons in the soil. The purpose of the nitrate solution is to facilitate the anaerobic microbial activities.

Thirty days after the infiltration of the nitrate solution the soil will again be randomly sampled as described earlier. After the initial thirty day sampling the soil will be sampled at sixty day intervals. The final sampling for ADEM reporting will consist of one composited sample as described earlier for each fifty cubic yard section of soil. No resampling or analyses will be performed on sections where previous analysis results were less than 100 ppm. (This sampling strategy has been approved by ADEM for this project.) The design of this in situ remediation system will not effect the groundwater at this site due to the fact that the excavation has been made into a sealed cell.

Eighty to ninety percent of the petroleum contamination is expected to be degradated within the first sixty days and the remainder within the following six months.

This in situ bioremediation system has been designed to produce minimal contaminant emissions to the air. The by-product of biodegradation is carbon dioxide.

FINAL REPORT

The final report for ADEM will be a step by step synopsis of how the project was designed, sample protocol and analytical results. This report will include all drawings indicating sample locations and sample results. All soil samples collected and analyzed for TPH during this project will be according to EPA Method 418.1 (IR) as modified for soil.

W. Haynes Kelley, Jr. PE

APPENDIX B

ADEM GUIDELINES FOR UST CLOSURE (ABBREVIATED VERSION)

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ADEM

ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

UST CLOSURE REQUIREMENTS

Effective December 22, 1988, federal and state regulations require compliance with the following if a regulated Underground Storage Tank (UST) is to be permanently closed.

1. At least 30 days before beginning permanent closure, owners or operators must notify the Department of their intent to permanently close.

2. Owners or operators must empty and clean tank(s) by removing all liquids and accumulated sludges. To permanently close a tank, it must be either removed from the ground or filled with an inert solid material. Examples of an inert solid material include sand, concrete and foams classified as inert. If foams are used additional measures should be taken to properly ballast the tank, such as partial filling with sand or concrete, where there is a possibility of a high water table. The notification referenced in Item 1. above should indicate whether the tank will be removed or filled with an inert solid. If a tank is to be filled with an inert solid, the type of inert solid should be identified. Additionally, all lines, manways and/or other connections must be capped or closed.

3. Before permanent closure is completed, owners or operators must measure for the presence of a release where contamination is most likely to be present at the UST site. **THE DISCOVERY OF PETROLEUM CONTAMINATION DURING CLOSURE SUCH AS PETROLEUM CONTAMINATED SOILS, DISSOLVED PRODUCT IN THE GROUNDWATER OR FREE PRODUCT ON THE GROUNDWATER MUST BE REPORTED WITHIN 24 HOURS OF DISCOVERY. THE ENCLOSED UST CLOSURE SITE ASSESSMENT REPORT FORM NO. 1133 MUST BE SUBMITTED TO THE DEPARTMENT WITHIN 45 DAYS OF INITIATING CLOSURE AT THE FOLLOWING ADDRESS.**

   Groundwater Branch
   Water Division
   Alabama Department of Environmental Management
   1751 Cong. W. L. Dickinson Drive
   Montgomery, Alabama 36130

   FAILURE TO PROVIDE PROPER RELEASE NOTIFICATION, OR FAILURE TO SUBMIT THE CLOSURE SITE ASSESSMENT IN THE SPECIFIED TIME PERIOD IS A VIOLATION OF DEPARTMENT REGULATIONS AND MAY RESULT IN LOSS OF AUST TRUST FUND COVERAGE.

   Guidelines for performing the site assessment are enclosed. The site assessment must be performed in accordance with acceptable geologic practices by a geologist or engineer experienced in hydrogeological investigations.

   Site assessment requirements may be waived if a properly designed vapor monitoring or groundwater monitoring release detection system was routinely used and properly operating at the time of closure and indicates no release has occurred.

4. Owners or operators must maintain records for at least 3 years following closure that are capable of demonstrating compliance with Items 1. through 3. above.

5. Any questions concerning these requirements should be directed to the ADEM Groundwater Branch at 205/270-5655.

ADEM GUIDELINES FOR PERFORMING A SITE ASSESSMENT FOR AN UST CLOSURE

Where applicable, an UST owner or operator can perform either of the following two types of site assessments identified in items 1. or 2. to comply with UST closure requirements.

1. The following procedures may be used in satisfying closure site assessment requirements when the tank excavation pit and/or piping trenches are completely open and available for representative sample collection. Any standing water should be removed and properly managed prior to taking soil samples. If personnel are to enter an excavation to collect soil samples, OSHA requirements should be complied with. Copies of the these requirements may be obtained from:

   OSHA
   2047 Canyon Road
   Todd Mall
   Birmingham, Alabama 35126
   Phone: (205) 731-1534

   a. Soils samples shall be collected from the sides and base of the tank pit and the bottom of the piping trenches. At least one sample shall be collected from each side of the pit and at least one sample from the pit base for every tank that was present in the excavation. In cases where multiple tanks are located in one pit and/or the pit is large, side samples should be taken every 25 feet in the excavation. Side samples shall be collected from the lowest one-third of the tank diameter. One sample per 10 lineal feet shall be collected from the base of piping trenches. Samples from the tank pit side, base, and piping trenches shall be representative of the area being sampled.

   b. Analyze soil samples for the presence of total petroleum hydrocarbons in accordance with the methods listed in item 3 below. Where applicable, soils should be analyzed for lead, using EPA method 239.2.

   c. Determine the elevation of the groundwater table. Information on the elevation of the water table may be obtained from a boring located adjacent to the tank pit or from a nearby location. The base of the pit may be extended downward to obtain groundwater information. If approved by the Department prior to use, water table elevation data may be obtained from topographical features which provide surface indication of the water table, and this data is substantiated by literature values.

d. (1) Where the analytical results of all the required soil samples taken from the tank pit and/or piping trench have a total petroleum hydrocarbon concentration of less than or equal to 10 ppm, the Department may consider the investigation to be complete and no further action will be required.

(2) Where the analytical results of all the required soil samples taken from the tank pit and/or piping trench have a Total Petroleum Hydrocarbon concentration of less than or equal to 100 ppm and where the seasonal high groundwater table is 5 feet or greater below the bottom of the tank excavation pit and/or piping trench the Department may consider the investigation to be complete and no further action will be required.

(3) Where the analytical results of any or all of the required soil samples taken from the tank pit and/or piping trench have a Total Petroleum Hydrocarbon concentration of greater than 10 ppm and where the seasonal high groundwater table is less than 5 feet below the bottom of the tank excavation pit and/or piping trench or where standing water in the excavation pit or piping trench is indicative of the groundwater table elevation, groundwater samples must be collected at a minimum of one up gradient and three down gradient locations unless directed to do otherwise by the Department. Groundwater samples shall be analyzed for the parameters identified in Item 3 below according to the type of product lost.

(4) Where the analytical results of any or all of the required soil samples taken from the tank pit and/or piping trench have a Total Petroleum Hydrocarbon concentration of greater than 100 ppm and where the seasonal high groundwater table is 5 feet or greater below the bottom of the tank excavation pit and/or piping trench, the Department will not require groundwater samples during the closure assessment. However, the Department may require further assessment at a later date which could include groundwater sampling.

e. Subject to the results of the closure site assessment, the Department may require additional investigative and/or corrective actions.

2. The following procedures may be used in satisfying closure site assessment requirements when the tank excavation pit and/or piping trench is not completely open and available for representative sample collection.

a. Soil samples shall be collected from around the perimeter of the original tank excavation through use of soil borings. At least one sample shall be collected from each side of the original tank excavation. In cases where the original tank excavation is large, samples should be taken every 25 feet around the perimeter. Samples shall be taken at a depth approximately even with the depth of the lowest one-third of the tank diameter and at least one sample should be taken at a depth which is approximately 1 foot below the base of the tank. One sample per 10 lineal feet shall be collected from a depth of approximately 1 foot below the base of the piping. Soil sampling shall be representative of the area and depths which most likely have been affected by a release.

b. Analyze soil samples for the presence of total petroleum hydrocarbons in accordance with the methods listed in item 3 below. Where applicable, soils should be analyzed for lead, using EPA method 239.2.

c. Determine the elevation of the groundwater table. Information on the elevation of the water table may be obtained from a boring located adjacent to the tank pit or from a nearby location. If approved by the Department prior to use, water table elevation data may be obtained from topographical features which provide surface indication of the water table, and this data is substantiated by literature values.

d. (1) Where the analytical results of all the required soil samples taken from around the tank and/or piping have a Total Petroleum Hydrocarbon concentration of less than or equal to 10 ppm, the Department may consider the investigation to be complete and no further action will be required.

(2) Where the analytical results of all the required soil samples taken from around the tank and/or piping have a Total Petroleum Hydrocarbon concentration of less than or equal to 100 ppm and where the seasonal high groundwater table is 5 feet or greater below the bottom of the tank or piping the Department may consider the investigation to be complete and no further action will be required.

(3) Where the analytical results of any or all of the required soil samples taken from around the tank and/or piping have a Total Petroleum Hydrocarbon concentration of greater than 10 ppm and where the seasonal high groundwater table is less than 5 feet below the bottom of the tank and/or piping, groundwater samples must be collected at a minimum of one up-gradient and three down-gradient locations unless directed to do otherwise by the Department. Groundwater samples shall be analyzed for the parameters identified in item 3 below according to the type of product lost.

(4) Where the analytical results of any or all of the required soil samples taken from around the tank and/or piping have a Total Petroleum Hydrocarbon concentration of greater than 100 ppm and where the seasonal high groundwater table is 5 feet or greater below the bottom of the tank and/or piping, the Department will not require groundwater samples during the closure assessment. However, the Department may require further assessment at a later date which could include groundwater sampling.

e. Subject to the results of the closure site assessment, the Department may require additional investigative and/or corrective actions.

3. Analytical Methods and Parameters*

Soils	
Total Petroleum Hydrocarbons	Standard Method (18th Edition) 5520 E & F and EPA Methods 9071, 418.1 I.R.

Groundwater (Gasoline analytical group)

Benzene	EPA Method 602 or 624
Ethyl Benzene	
Toluene	
Total Xylenes	

Groundwater (Kerosene analytical group kerosene, diesel, jet fuels)

Polynuclear Aromatic Hydrocarbons	EPA Method 610 or 625
Benzene	EPA Method 602 or 624
Ethyl Benzene	
Toluene	
Total Xylenes	

*Equivalent methods may be approved by the Department on a case by case basis.

GUIDELINES FOR THE DISPOSAL OF NON-HAZARDOUS PETROLEUM CONTAMINATED WASTES

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

DIVISION 13 - SOLID WASTE PROGRAM

LAND DIVISION
(205) 270-5643)

Revised December 2, 1991

*NOTE: These guidelines do not address the requirements for the removal of underground storage tanks. Contact the UST[*1] Section at (205) 270-5655*

A. Soils which have been contaminated with petroleum material resulting from a spill should be reported to the Field Operation Division[*2] of ADEM. To report spills occurring after normal office hours or on holidays, contact Field Operations through the Department of Public Safety's 24 hour phone at (205) 242-4378. Representatives of the Field Operation Division are not responsible for clean-up activity but available to provide technical assistance to the parties involved.

B. Contaminated material which must be removed from the point of generation must be disposed of in a permitted solid waste disposal facility following ADEM (Solid Waste Branch) approval, or transported to an approved treatment[*3] facility for proper treatment and final disposition.

C. Excavated soils, except for those classified as small quantities[*4], or other wastes which are not known to be contaminated with a petroleum material, but are suspected (ex. - from a service station), should be handled as if they were, until laboratory analysis (limits listed below) confirms that no contamination is present. (NOTE: ALL EXCAVATED WASTES FROM UST SITES MUST BE SAMPLED REGARDLESS OF THE TPH[*5], LEAD ANALYSIS, OR FIELD SCREENING METHOD CONDUCTED WITHIN THE EXCAVATION.) Sampling and analysis of wastes must be conducted by qualified personnel trained in this field.

D. Any volume of soil with a TPH concentration of less than (<)[*6] 10ppm is not considered contaminated and thus is not regulated by Division 13 of the ADEM Administrative Code.

E. Where 100 kilograms (220 lbs) or greater (≥)[*6] of Petroleum Product or Waste must be disposed of and the petroleum product released was either a used, heavy[*13] petroleum material or contained lead, analyses must be performed to determine if the Petroleum Contaminated Waste (PCW)[*8] is a hazardous waste or one needing special disposal (used heavy - TCLP[*9]; leaded gas - total lead (EPA Method 239.2) or TCLP for lead). (NOTE: TOTAL LEAD MAY BE USED AS A SCREENING METHOD BUT TCLP MUST BE UTILIZED IF TOTAL LEAD IS 100.0 ppm OR GREATER.)

F. PETROLEUM CONTAMINATED WASTES SAMPLING & ANALYTICAL REQUIREMENTS*10:

CLASS:	TPH SAMPLING AND ANALYTICAL REQUIREMENTS	LEAD AND HAZARDOUS WASTE ANALYTICAL REQUIREMENTS
a. Light*11	5 grab samples composited to 1 sample. for each 20 yd^3 Standard Method 503 D&E EPA Methods 9071, 418.1 Infra Red	1 grab sample for each 20 yd^3 composited to 1 sample per incident Total lead (EPA Method 239.2) or TCLP for Lead when total lead is 100.0 ppm or greater
b. Medium*12	Same as for Light	Not Required
c. Heavy*13:		
Used	Same as for Light	5 grab samples composited to 1 sample for each 100 yd^3 TCLP Test if TPH > 100 ppm.
Virgin	Same as for Light	Not Required
d. Mixed	Handled on a case-by-case basis	
e. Absorbent*14	NONE	NONE

G.	CLASS:	TPH	LEAD CONC. TOTAL OR HW*15	MANAGEMENT OPTIONS
c(2)	Used	≥3,000	Same as above	Manage at select disposal facilities up to 300 yd^3 per incident with Land Division Approval. If ≥ 300 yd^3 (see item H)
c(3)	Used	NA	TCLP Hazardous Wastes	Manage as a hazardous waste. Contact RCRA Compliance Branch (271-7726).
c(4)	Virgin	<3,000 ppm	NA	Manage at a permitted disposal facility up to 300 yd^3 per incident with Land Division Approval. If ≥ 300 yd^3 (see item H)
c(5)	Virgin	≥3,000	NA	Manage at select disposal facilities up to 300 yd^3 per incident with Land Division Approval. If > 300 yd^3 (see item H)
d.	Mixed	Handled on a case-by-case basis		
e.	Absorbent	NONE	NONE	Manage at a permitted disposal facility with Land Division Approval. No free liquids may exist at time of disposal. No strong petroleum odor may exist.

H. Management Options:

(1) Utilize a treatment method contained in "*3" below.

(2) Quantities of medium or heavy PCW > 300 yd^3 may be accepted at select disposal facilities with prior approval from ADEM (Solid Waste Branch) and the landfill operator. If the landfill permittee will not accept the excavated soil, other means of treatment and/or processing will be necessary to make the waste suitable for disposal.

APPENDIX C

PEER OVERSIGHT ACTIVITIES

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APPENDIX C
PEER OVERSIGHT ACTIVITIES

DATE PEER REPRESENTATIVE ON-SITE	ACTIVITIES CONDUCTED
March 14 - 28, 1994	Removal and disposal of the seven 25,000-gal USTs and the 500-gal sludge tank. Collection of soil samples from the UST pit. Excavated soil treated in the bio-cells.
April 4 - 11, and 18 - 29, 1994	Removal of the concrete pad in the UST pit. Collection of soil samples from the UST pit. Collection of soil samples in the over-excavated area. Treatment of soil in bio-cells continues.
May 2 - 26, 1994	Collection of UST closure samples from the UST pit. Collection of soil samples in the over-excavated area. Treatment of soil in bio-cells continues.
June 1 - 10, and 16 - 24, 1994	Collection of soil samples in the over excavated area. Treatment of soil in bio-cells continues.
July 7 - 8, 1994	Free product bailed from wells. Collection of soil samples in the over-excavated area. Collection of soil stockpile samples. Treatment of soil in bio-cells continues.
September 8-9, and 13 - 14, 1994	Stockpiled soil moved to Building 301. Collection of soil samples in the over-excavated area. Treatment of soil in bio-cells continues.
October 5 - 7, and 25 - 27, 1994	Collection of soil samples in the over-excavated area. Treatment of soil in bio-cells continues.
November 3 - 4, 1994 (Last Visit)	Collection of soil samples in the over-excavated area. Treatment of soil in bio-cells continues.

APPENDIX D

KEY PHOTOGRAPHS

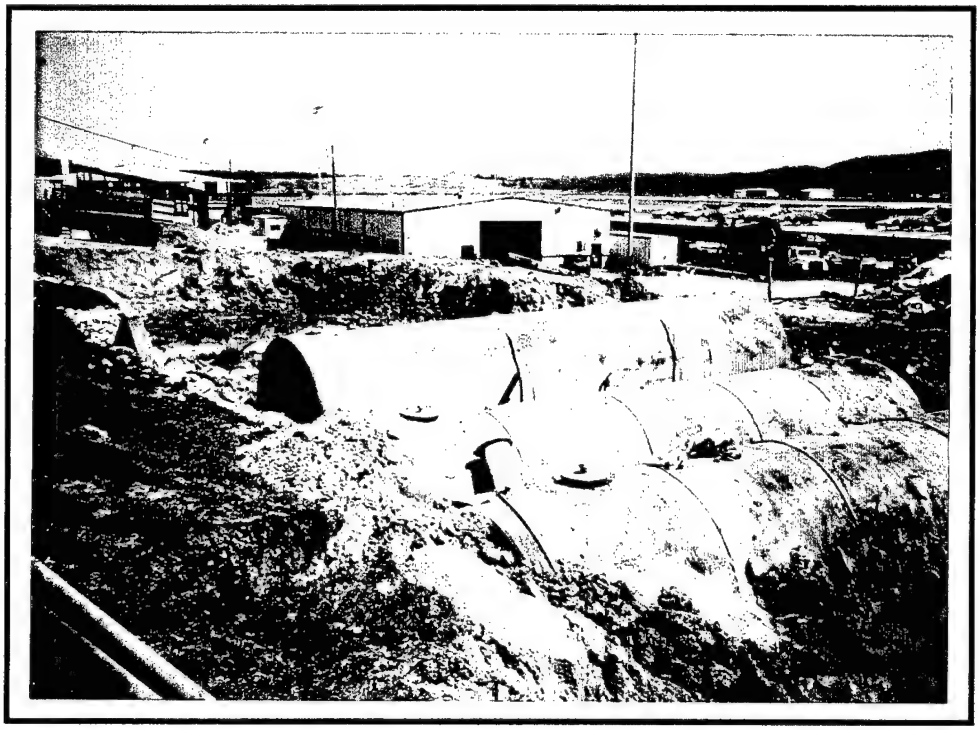

Photo No. 1: South-eastward view of UST pit with three USTs still in place.

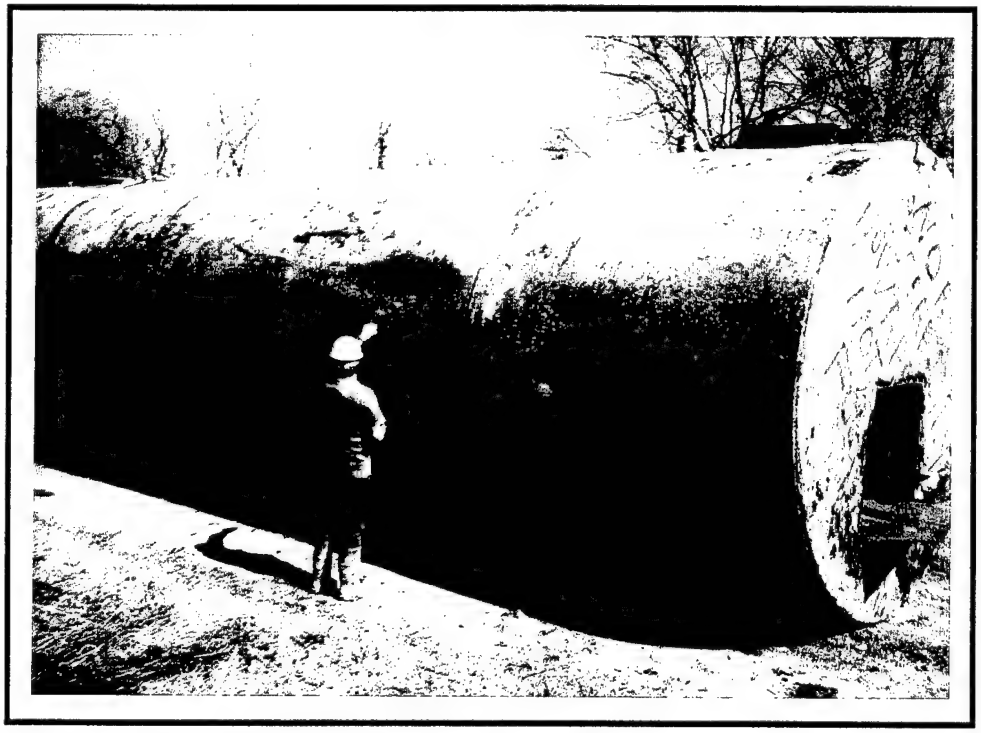

Photo No. 2: 25,000-gal fuel tank being inspected at scrap yard.

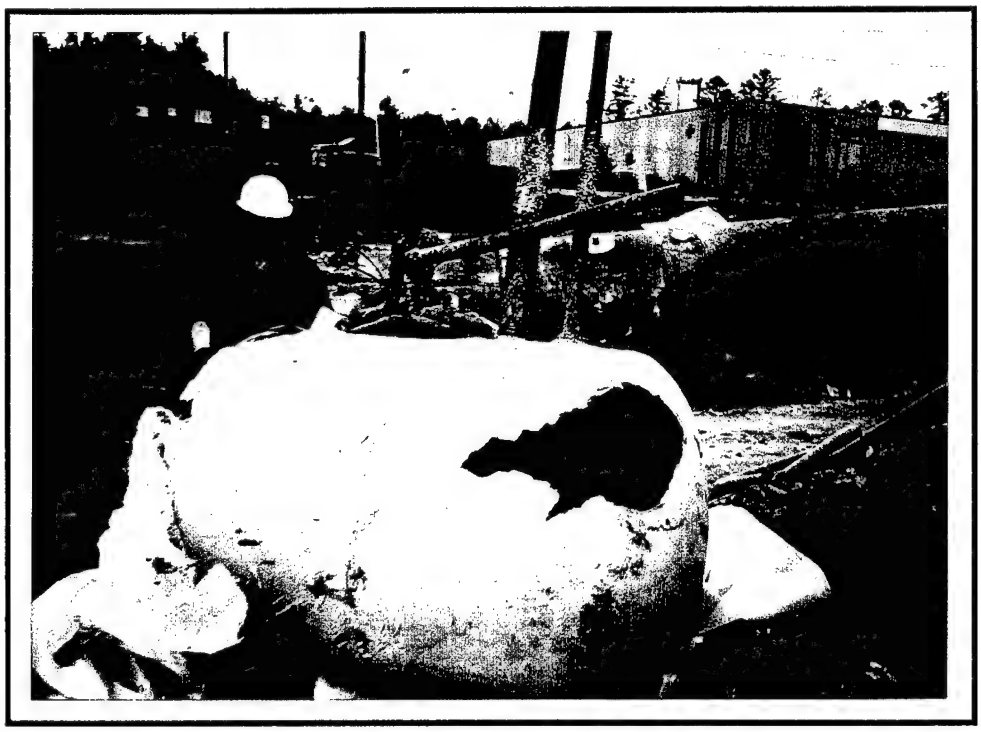

Photo No. 3: 500-gal sludge tank after removal.
(Note - damage was caused during excavation)

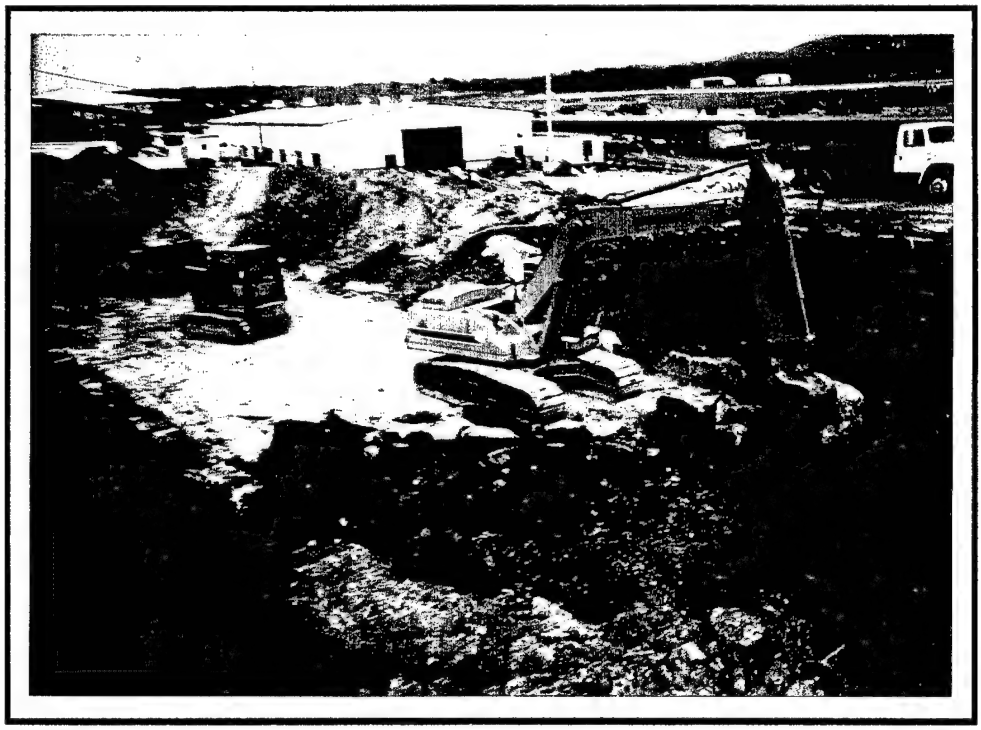

Photo No. 4: Removal of concrete pad from the UST pit.

Photo No. 5: Contractor (EMC) collection of free product from MW-12

Photo No. 6: Southward view of UST pit and overexcavated area.

Photo No. 7: Contractor (EMC) collection of soil samples.

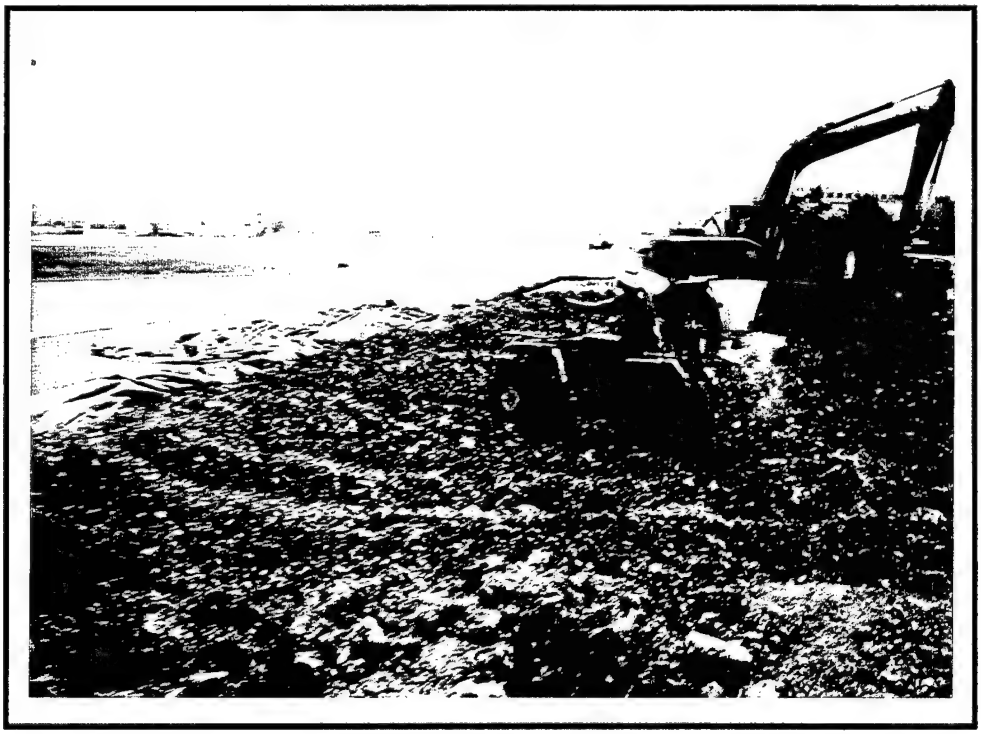

Photo No. 8: Adding nutrients to the soils of a bio-cell.

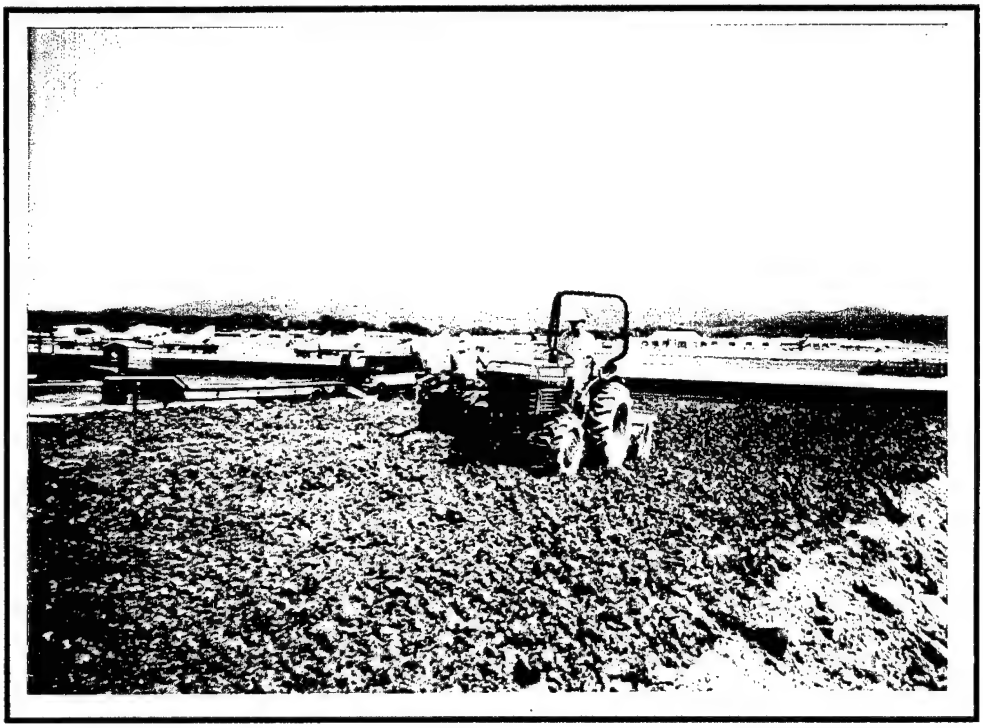

Photo No. 9: Tilling of soil in a bio-cell.

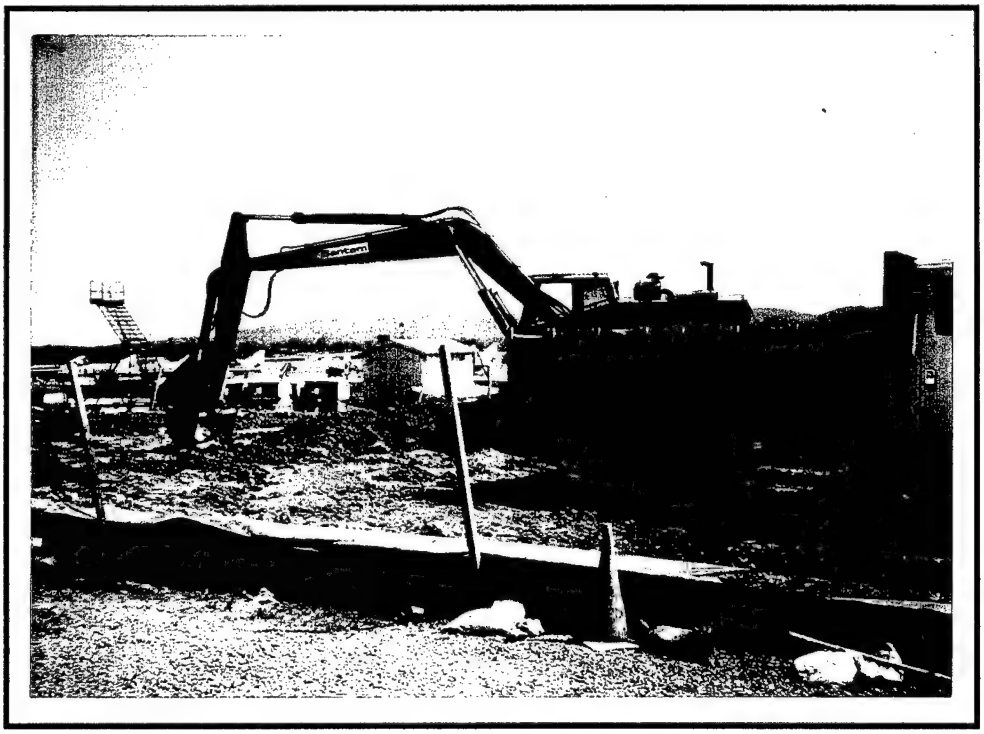

Photo No. 10: Removing soil from a bio-cell.

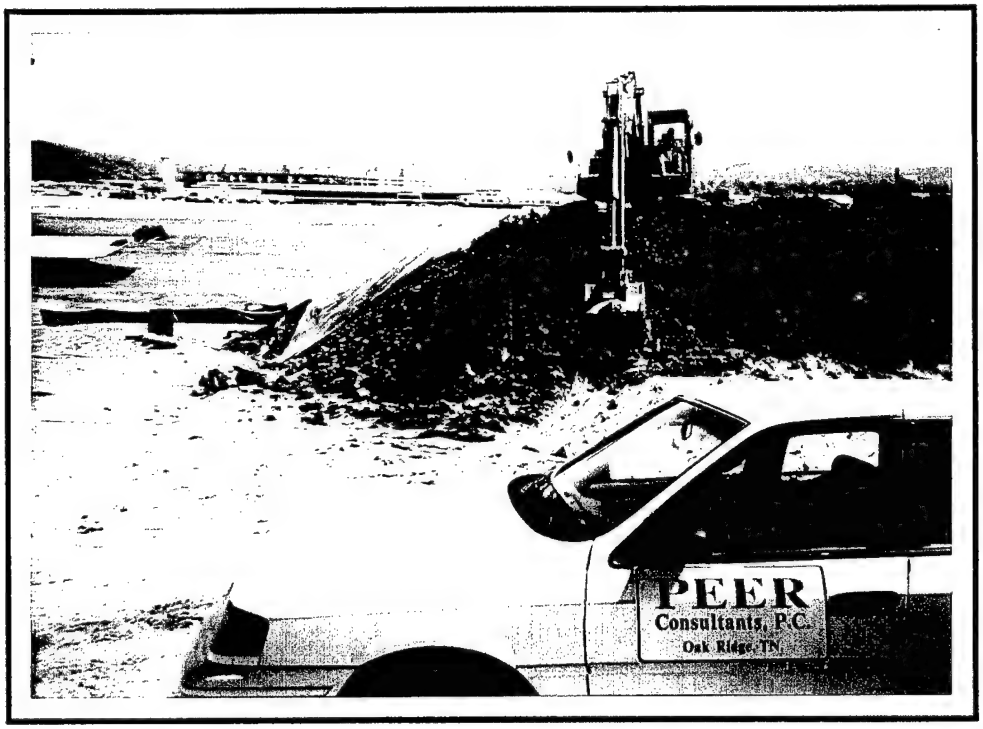

Photo No. 11: Soil stockpile in the vicinity of the site.

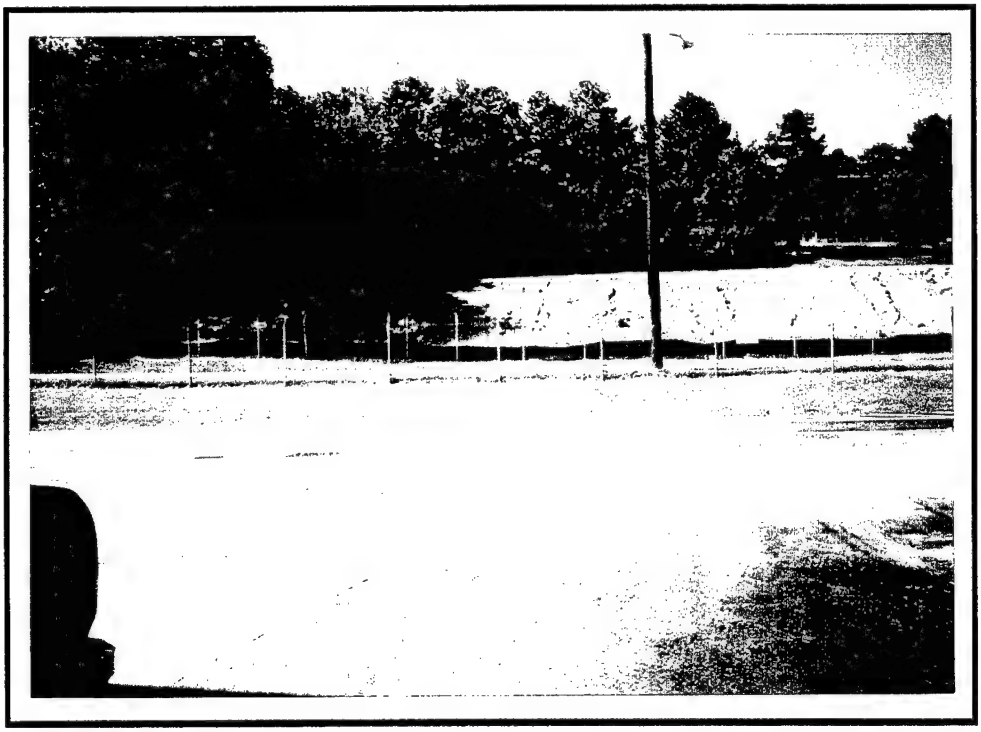

Photo No. 12: Soil stockpile in the vicinity of Building 301.

APPENDIX E

ANALYTICAL DATA

STILLBROOK

Environmental Testing Laboratory, Inc.
305 Crawford Street
Fairfield, AL 35064
(205) 788-1750

Lab Invoice #: 3779

Client: Ms. Lori Melroy
Peer Consultants, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830

Date: May 3, 1994

Project Name: Birmingham ANG
Project Location: N/A
Sample Matrix: Soil
Sampled By: Carl Koch
Lab Analyst: Jimmie W. Brooks
Test Method: "Methods for Chemical Analysis of Water and Wastewater" EPA-600/4-79-020, 3/83 Method 418.1.

Project Number: 1443K06
P.O Number: PEER-0073
Date Collected: April 26, 1994
Analysis Date: April 28, 1994

TOTAL PETROLEUM HYDROCARBONS

Lab I.D.	Item No.	Sample No.	TPH, mg/kg
23556	1	06-11-SS-PF-20	16
23557	2	06-11-SS-PF-20	25
23558	3	06-11-SS-PF-20	32
23559	4	06-11-SS-PF-20	12
23560	5	06-11-SS-PF-20	23
23561	6	06-11-SS-PF-20	11
23562	7	06-11-SS-PF-20	13
23563	8	06-11-SS-PFST-06	14
23564	8A	06-11-SS-SWST-04	19
23565	9	06-11-SS-NW-15	11
23566	10	06-11-SS-NW-15	7
23567	11	06-11-SS-NW-15	7
23568	12	06-11-SS-NW-15	12
23569	13	06-11-SS-NW-15	13
23570	14	06-11-SS-NW-15	20
23571	15	06-11-SS-NW-15	13
23572	16	06-11-SS-NW-10	8
23573	17	06-11-SS-EW-10	35
23574	18	06-11-SS-EW-8	9
23575	19	06-11-SS-EW-12	7
23576	26	06-11-SS-WW-12	85
23577	27	06-11-SS-WW-12	19
23578	28	06-11-SS-WW-15	45
23579	20	06-11-SS-SW-10	10
23580	21	06-11-SS-SW-09	10
23581	22	06-11-SS-SW-08	10
23582	23	06-11-SS-SW-10	6
23583	24	06-11-SS-SW-06	19
23584	25	06-11-SS-WW-06	12
23585	29	06-11-SS-PF-10	11
23586	30	06-11-SS-PF-10	17

Detection Limit = 1 mg/kg

Mark R. Sutherland
Director, Stillbrook

ADEM Laboratory Certification I.D.# 40710

STILLBROOK

Environmental Testing Laboratory, Inc.
305 Crawford Street
Fairfield, AL 35064
(205) 788-1750

Lab Invoice #: 3779

Date: May 3, 1994

Client: Ms. Lori Melroy
Peer Consultants, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830

Project Name: Birmingham ANG
Project Location: N/A
Sample Matrix: Soil
Sampled By: Carl Koch
Lab Analyst: Jimmie W. Brooks
Test Method: "Methods for Chemical Analysis of Water and Wastewater" EPA-600/4-79-020, 3/83 Method 418.1.

Project Number: 1443K06
P.O Number: PEER-0073

Date Collected: April 26, 1994
Analysis Date: April 28, 1994

TOTAL PETROLEUM HYDROCARBONS

Lab I.D.	Field I.D.	TPH, mg/kg
23556	1	16
23557	2	25
23558	3	32
23559	4	12
23560	5	23
23561	6	11
23562	7	13
23563	8	14
23564	8A	19
23565	9	11
23566	10	7
23567	11	7
23568	12	12
23569	13	13
23570	14	20
23571	15	13
23572	16	8
23573	17	35
23574	18	9
23575	19	7
23576	26	85
23577	27	19
23578	28	45
23579	20	10
23580	21	10
23581	22	10
23582	23	6
23583	24	19
23584	25	12
23585	29	11
23586	30	17

Detection Limit = 1 mg/kg

Respectfully submitted,

Mark R. Sutherland
Director, Stillbrook

STILLBROOK

Environmental Testing Laboratory, Inc.
305 Crawford Street
Fairfield, AL 35064
(205) 788-1750

Lab Invoice #: 3779

Client: Ms. Lori Melroy
Peer Consultants, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830

Date: May 3, 1994

Project Name: Birmingham ANG
Project Location: N/A
Sample Matrix: Soil
Sampled By: Carl Koch
Lab Analyst: Larry Tribble
Test Method: SW846 "Test Methods for Evaluating Solid Wastes" 3rd Edition.
7000 Series Metals

Project Number: 1443K06
P.O Number: PEER-0073
Date Collected: April 26, 1994
Analysis Date: April 28-May 2, 1994

TOTAL RCRA METALS

Lab I.D.	23556	23557	23558	23559	23560	23561	23562	Detection Limit
Item No.	1	2	3	4	5	6	7	
Sample No.	06-11-SS-PF-20	06-11-SS-PF-20	06-11-SS-PF-20	06-11-SS-PF-20	06-11-SS-PF-20	06-11-SS-PF-20	06-11-SS-PF-20	
PARAMETERS	PPM (mg/kg)	PPM (mg/kg)	PPM (mg/kg)	PPM (mg/kg)	PPM (mg/kg)	PPM (mg/kg)	PPM (mg/kg)	PPM (mg/kg)
Arsenic	11.4	12.2	13.8	11.9	12.4	11.3	10.5	0.5
Barium	110	144	189	277	624	119	171	100
Cadmium	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2
Chromium	22	25	27	22	18	17	19	2
Lead	19.5	22.4	21.5	15.8	21.6	17.5	17.1	0.5
Mercury	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.1
Selenium	BDL	0.5	BDL	BDL	BDL	BDL	BDL	0.5
Silver	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2

Lab I.D.	23563							Detection Limit
Item No.	8							
Sample No.	06-11-SS-PFST-06							
PARAMETERS	PPM (mg/kg)							PPM (mg/kg)
Arsenic	17.1							0.5
Barium	BDL							100
Cadmium	BDL							2
Chromium	20							2
Lead	15.0							0.5
Mercury	BDL							0.1
Selenium	BDL							0.5
Silver	BDL							2

BDL = Below Detection Limit
Detection Limit, practical

Respectfully submitted,

Mark R. Sutherland
Director, Stillbrook

STILLBROOK

Environmental Testing Laboratory, Inc.
305 Crawford Street
Fairfield, AL 35064
(205) 788-1750

Lab Invoice #: 3779

Date: May 3, 1994

Client: Ms. Lori Melroy
Peer Consultants, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830

Project Name: Birmingham ANG
Project Location: N/A
Sample Matrix: Water
Sampled By: Carl Koch
Lab Analyst: Wayne Bensley
Test Method: "Methods for Chemical Analysis of Water and Wastes", EPA-600. Method 624.

Project Number: 1443K06
P.O Number: PEER-0073

Date Collected: April 26, 1994
Analysis Date: April 28, 1994

PURGEABLE AROMATIC HYDROCARBONS

Lab I.D.	23587	23588						*Detection
Item No.	QC	QC						Limit
Sample No.	Trip Blank	EQ Rinsate						PPB (ug/L)
PARAMETERS	PPB (ug/L)	PPB (ug/L)						
Benzene	BDL	BDL						5
Toluene	BDL	BDL						5
Ethylbenzene	BDL	BDL						5
Xylenes	BDL	BDL						5

BDL = Below Detection Limit

*Detection Limit, practical

Respectfully submitted,

Mark R. Sutherland
Director, Stillbrook

STILLBROOK

Environmental Testing Laboratory, Inc.

305 Crawford Street
Fairfield, AL 35064
(205) 788-1750

Lab Invoice #: 3779

Client: Ms. Lori Melroy
Peer Consultants, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830

Date: May 3, 1994

Project Name: Birmingham ANG
Project Number: 1443K06
Project Location: N/A
P.O Number: PEER-0073
Sample Matrix: Water/Soil
Sampled By: Carl Koch
Date Collected: April 26, 1994
Lab Analyst: WB/JWB/LCT
Analysis Date: April 28-May 2, 1994
Test Method: "Methods for Chemical Analysis of Water and Wastes" EPA-600/4-79-020. Method 624
SW846 "Test Methods for Evaluating Solid Wastes" 3rd Ed. 7000 Series Metals.
"Methods for Chemical Analysis of Water and Wastes" EPA-600/4-79-020. Method 418.1

QUALITY CONTROL DATA

Ultra AMM 802 Purgeable Aromatic

	Assayed	Range	Units
Benzene:	20	12.8-27.2	ug/L
Toluene:	21	14.9-25.1	ug/L
Ethylbenzene:	22	11.8-28.2	ug/L
Xylenes:	21	10.0-30.0	ug/L
Surrogate:			
Toluene d-8:	54	41-59	ug/kg

ERA TPH Reference Control Lot #91024-1

Assayed: 770 mg/kg **Range:** 642-1340 mg/kg

Lab Blank: 4-28-94 = Below Detection Limit
Lab Duplicate: 4-28-94 = 10% RPD
Lab Spike: 4-28-94 =91% Recovery

ERA Metals Reference Control Lot #9947

Assayed: 491 ug/L **Range:** 410-590 ug/L

Respectfully submitted,

Mark R. Sutherland
Director, Stillbrook

PEER Consultants, P.C.

CHAIN-OF-CUSTODY RECORD

COC # PEER-0073

PROJECT NO. 1443K06

PROJECT NAME Birmingham ANG

SAMPLERS (SIGNATURE) Carl Stock

ITEM NO.	DATE (MM/DD/YY)	TIME (MILITARY)	COMP	GRAB	SAMPLE NUMBER	MATRIX (1)	NUMBER, TYPE, AND VOLUME OF CONTAINERS	ANALYSES	PRESERVATIVES
01	4/26/94	0911		X	06-11-55-PF-20	S	1 Clear Glass 200 ML	TPH & RCRA 8 Metals	Cool 4°C
02	4/26/94	0917		X	06-11-55-PF-20	S	1 clear Glass 250 ML	TPH & RCRA 8 Metals	Cool 4°C
03	4/26/94	0920		X	06-11-55-PF-20	S	1 clear Glass 250 ML	TPH & RCRA 8 Metals	Cool 4°C
04	4/26/94	0925		X	06-11-55-PF-20	S	1 Clear Glass 250 ML	TPH & RCRA 8 Metals	Cool 4°C
05	4/26/94	0929		X	06-11-55-PF-20	S	1 Clear Glass 250 ML	TPH & RCRA 8 Metals	Cool 4°C
06	4/26/94	0932		X	06-11-55-PF-20	S	1 Clear Glass 250 ML	TPH & RCRA 8 Metals	Cool 4°C
07	4/26/94	0937		X	06-11-55-PF-20	S	1 Clear Glass 250 ML	TPH & RCRA 8 Metals	Cool 4°C
08	4/26/94	0943		X	06-11-55-PFST-06	S	1 Clear Glass 250ML	TPH & RCRA 8 Metals	Cool 4°C
8A	4/26/94	1150		X	06-11-55-SWST-04	S	1 Clear Glass 250 ML	TPH	Cool 4°C
09	4/26/94	1310		X	06-11-55-NW-15	S	1 Clear Glass 250 ML	TPH	Cool 4°C
10	4/26/94	1315		X	06-11-55-NW-15	S	1 Clear Glass 250 ML	TPH	Cool 4°C

Relinquished By: (Signature)	Date/Time	Received By: (Signature)
Carl Stock	4/27/94 1540	Ryan Lovett
Relinquished By: (Signature)	Date/Time	Received By: (Signature)
Relinquished By: (Signature)	Date/Time	Received By: (Signature)

Analytical Laboratory: Stillbrook ENV. Testing Lab
305 Crawford Street
Fairfield, Ala 35064
Contact: Mark R. Sutherland
Phone No: 205-788-1750

Send results to:
PEER CONSULTANTS, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830
Attn: Lori Melroy
(615) 483-3191

Distribution:
White Copy Accompanies Shipment
Yellow Copy to Project Manager
Pink Copy for Field Files

(1) S - Soil SD - Sediment SL - Sludge SW - Solid Waste
GW - Ground Water SW - Surface Water LW - Liquid Waste

PEER Consultants, P.C.

CHAIN-OF-CUSTODY RECORD

COC # PEER-0074

PROJECT NO.: 1443K06

PROJECT NAME: Birmingham ANG

SAMPLERS (SIGNATURE): Carl Koch

ITEM NO.	DATE (MM/DD/YY)	TIME (MILITARY)	COMP	GRAB	SAMPLE NUMBER	MATRIX (1)	NUMBER, TYPE, AND VOLUME OF CONTAINERS	ANALYSES	PRESERVATIVES
11	4/26/94	1325		X	06-11-55-NW-15	S	1 Clear Glass 250 ML	TPH	Cool 4°C
12	4/26/94	1340		X	06-11-55-NW-15	S	1 Clear Glass 250 ML	TPH	Cool 4°C
13	4/26/94	1410		X	06-11-55-NW-15	S	1 Clear Glass 250 ML	TPH	Cool 4°C
14	4/26/94	1415		X	06-11-55-NW-15	S	1 Clear Glass 250 ML	TPH	Cool 4°C
15	4/26/94	1425		X	06-11-55-NW-15	S	1 Clear Glass 250 ML	TPH	Cool 4°C
16	4/26/94	1435		X	06-11-55-NW-10	S	1 Clear Glass 250 ML	TPH	Cool 4°C
17	4/26/94	1500		X	06-11-55-EW-10	S	1 Clear Glass 250 ML	TPH	Cool 4°C
18	4/26/94	1510		X	06-11-55-EW-8	S	1 Clear Glass 250 ML	TPH	Cool 4°C
19	4/26/94	1515		X	06-11-55-EW-12	S	1 Clear Glass 250 ML	TPH	Cool 4°C
26	4/26/94	1645		X	06-11-55-WW-12	S	1 Clear Glass 250 ML	TPH	Cool 4°C
27	4/26/94	1700		X	06-11-55-WW-12	S	1 Clear Glass 250 ML	TPH	

	Date/Time	
Relinquished By: (Signature) Carl Koch	4/27/94 1540	Received By: (Signature) Karen Unruh
Relinquished By: (Signature)	Date/Time	Received By: (Signature)
Relinquished By: (Signature)	Date/Time	Received By: (Signature)

Analytical Laboratory: Stillbrook ENV. Testing Lab
305 Crawford Street
Fairfield, Ala 35064
Contact: Mark R. Sutherland
Phone No: 205-788-1750

Send results to:
PEER CONSULTANTS, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830
Attn: Lori Melroy
(615) 483-3191

Distribution:
White Copy Accompanies Shipment
Yellow Copy to Project Manager
Pink Copy for Field Files

(1) S - Soil SD - Sediment SL - Sludge SW - Solid Waste
GW - Ground Water SW - Surface Water LW - Liquid Waste

PEER Consultants, P.C.

CHAIN-OF-CUSTODY RECORD

COC # PEER-0075

PROJECT NO. 1443K06

PROJECT NAME Birmingham ANG

SAMPLERS (SIGNATURE) Carl Lock

ITEM NO.	DATE (MM/DD/YY)	TIME (MILITARY)	COMP	GRAB	SAMPLE NUMBER	MATRIX (1)	NUMBER, TYPE, AND VOLUME OF CONTAINERS	ANALYSES	PRESERVATIVES
28	4/26/94	1705		X	06-11-55-WW-15	S	1 Clear Glass 250 ML	TPH	Cool 4°C
20	4/27/94	0820		X	06-11-55-SW-10	S	1 Clear Glass 250 ML	TPH	Cool 4°C
21	4/27/94	0830		X	06-11-55-SW-09	S	1 Clear Glass 250 ML	TPH	Cool 4° C
22	4/27/94	0835		X	06-11-55-SW-08	S	1 Clear Glass 250 ML	TPH	Cool 4° C
23	4/27/94	1245		X	06-11-55-SW-10	S	1 Clear Glass 250 ML	TPH	Cool 4° C
24	4/27/94	1255		X	06-11-55-SW-06	S	1 Clear Glass 250 ML	TPH	Cool 4°C
25	4/27/94	1350		X	06-11-55-WW-06	S	1 Clear Glass 250 ML	TPH	Cool 4°C
29	4/27/94	1400		X	06-11-55-PF-10	S	1 Clear Glass 250 ML	TPH	Cool 4°C
30	4/27/94	1405		X	06-11-55-PF 10	S	1 Clear Glass 250 ML	TPH	Cool 4°C
QC					TRIP Blank		2-40-ML Glass Vials	B.T.E.X.	Cool 4°C
QC					Equipment RINSate		2-40ML Glass Vials	B.T.E.X.	Cool 4°C

Relinquished By: (Signature) Carl Lock	Date/Time 4/27/94 1540	Received By: (Signature) Lynn Everett
Relinquished By: (Signature)	Date/Time	Received By: (Signature)
Relinquished By: (Signature)	Date/Time	Received By: (Signature)

Analytical Laboratory: Stillbrook ENV. Testing Lab
305 Crawford Street
Fairfield, Ala 35064
Contact: Mark R. Sutherland
Phone No: 205-788-1750

Send results to:
PEER CONSULTANTS, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830
Attn: Lori Melroy
(615) 483-3191

Distribution:
White Copy Accompanies Shipment
Yellow Copy to Project Manager
Pink Copy for Field Files

(1) S - Soil SD - Sediment SL - Sludge SW - Solid Waste
GW - Ground Water SW - Surface Water LW - Liquid Waste

STILLBROOK

Environmental Testing Laboratory, Inc.
305 Crawford Street
Fairfield, AL 35064
(205) 788-1750

Lab Invoice #: 3906

Client: Lori Melroy
Peer Consultants, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830

Date: May 27, 1994

Project Name: Birmingham ANG
Project Number: 1443K06
Project Location: N/A
P.O Number: N/A
Sample Matrix: Soil
Sampled By: Carl Koch
Date Collected: May 19, 1994
Lab Analyst: JWB
Analysis Date: May 25, 1994
Test Method: "Methods for Chemical Analysis of Water and Wastes", EPA -600/3-83. Method 418.1

TOTAL PETROLEUM HYDROCARBONS

Lab I.D.	Item No.	Sample No.	TPH, mg/kg
24140	31	06-11-SS-NW-05	21
24141	32	06-11-SS-NW-04	17
24142	33	06-11-SS-NE-04	13
24143	34	06-11-SS-NW-05	12

Detection Limit = 1 mg/kg

Respectfully submitted,

Mark R. Sutherland
Director, Stillbrook

STILLBROOK

Environmental Testing Laboratory, Inc.
305 Crawford Street
Fairfield, AL 35064
(205) 788-1750

Lab Invoice #: 3906

Client: Lori Melroy
Peer Consultants, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830

Date: May 27, 1994

Project Name: Birmingham ANG
Project Location: N/A
Sample Matrix: Soil
Sampled By: Carl Koch
Lab Analyst: JWB

Project Number: 1443K06
P.O Number: N/A

Date Collected: May 19, 1994
Analysis Date: May 25, 1994

Test Method: "Methods for Chemical Analysis of Water and Wastes", EPA -600/3-83. Method 624

PURGEABLE AROMATIC HYDROCARBONS

Lab I.D.	24144	24145							*Detection Limit
Item No.	QC	QC							
Sample No.	Trip Blank	EQ Rinsate							
PARAMETERS	PPB (ug/L)	PPB (ug/L)							PPB (ug/L)
Benzene	BDL	BDL							5
Toluene	BDL	BDL							5
Ethylbenzene	BDL	BDL							5
Xylenes	BDL	BDL							5

BDL = Below Detection Limit
Detection Limit, practical

Respectfully submitted,

Mark R. Sutherland
Director, Stillbrook

STILLBROOK

Environmental Testing Laboratory, Inc.
305 Crawford Street
Fairfield, AL 35064
(205) 788-1750

Lab Invoice #: 3906

Client: Lori Melroy
Peer Consultants, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830

Date: May 27, 1994

Project Name: Birmingham ANG
Project Location: N/A
Sample Matrix: Soil
Sampled By: Carl Koch
Lab Analyst: JWB
Test Method: "Methods for Chemical Analysis of Water and Wastes", EPA -600/3-83. Method 624. Method 418.1.

Project Number: 1443K06
P.O Number: N/A
Date Collected: May 19, 1994
Analysis Date: May 25, 1994

QUALITY CONTROL DATA

ERA TPH Reference Control Lot #91024-1

Assayed: 708 mg/kg
Range: 642-1340

Lab Blank: 5-27-94 = Below Detection Limit
Lab Duplicate: 5-27-94 = 10 % RPD
Lab Spike: 5-27-94 = 90 % Recovery

Ultra AMM 802 Purgeable Aromatic

	Assayed	Range	Units
Benzene:	25	12.8-27.2	ug/L
Toluene:	22	14.9-25.1	ug/L
Ethylbenzene:	22	11.8-28.2	ug/L
Xylenes:	22	10.0-30.0	ug/L
Surrogate:			
Toluene d-8:	50	44-55	ug/L

Respectfully submitted,

Mark R. Sutherland
Director, Stillbrook

PEER CONSULTANTS, P.C.

CHAIN-OF-CUSTODY RECORD

COC # PEER-0099

PROJECT NO. 1443K06

PROJECT NAME BIRMINGHAM ANG

SAMPLERS (SIGNATURE) Carl Koch

ITEM NO.	DATE (MM/DD/YY)	TIME (MILITARY)	COMP	GRAB	SAMPLE NUMBER	MATRIX (1)	NUMBER, TYPE, AND VOLUME OF CONTAINERS	ANALYSES	PRESERVATIVES
11430	5/19/94	0915		X	06-11-55-NW-05	S	1 Clear Glass 250 ML	TPH	Cool 4°C
11432	5/19/94	0925		X	06-11-55-NW-04	S	1 Clear Glass 250 ML	TPH	Cool 4°C
11433	5/19/94	0935		X	06-11-55-NW-04	S	1 Clear Glass 250 ML	TPH	Cool 4°C
11434	5/19/94	0945		X	06-11-55-NW-05	S	1 Clear Glass 250 ML	TPH	Cool 4°C
11444	QC				TRIP Blank		2-40-ML Glass vials	BTEX	Cool 4°C
11445	QC	5/19/94	1015		EQUIPMENT RINSate		2-40 ML Glass vials	B.T.E.X.	Cool 4°C

Relinquished By: (Signature) Carl Koch	Date/Time 5/25/94 1000	Received By: (Signature) Marilyn Herring	Analytical Laboratory: Stillbrook Env Testing Labs 305 Crawford Street Fairfield, Ala 35064
Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Contact: Mark R. Sutherland
Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Phone No: 205-788-1750

Send results to:

PEER CONSULTANTS, P.C.
575 Oak Ridge Turnpike
Oak Ridge, TN 37830
Attn: Lori Melroy
(615) 483-3191

Distribution:
White Copy Accompanies Shipment
Yellow Copy to Project Manager
Pink Copy for Field Files

(1) S - Soil SD - Sediment SL - Sludge SO - Solid Waste
GW - Ground Water SW - Surface Water LW - Liquid Waste

ENVIRONMENTAL SERVICE LABORATORIES, INC.

B.E.C.C.
2704 20th St. South Suite 200
Homewood, AL 35209

Attn: Marty Burford

Lab Number	DA15740
Date Received	10/03/96
Sample Date	10/03/96
Sample Time	14:10
Sample Matrix	WATER
Sample Description	MW #2

TEST METHODS:

1-Standard Methods for the Examination of Water and Wastewater, 18th Edition, 1992.
2-Methods for Chemical Analysis of Water and Wastes, EPA March, 1983.
3-EPA Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057, July, 1982.
4-Methods for Evaluating Solid Waste Physical/Chemical Methods, SW-846,Third Edition,

PARAMETER	DATA	UNITS	METHOD	ANALYST	DATE	TIME
enzene	<5.0	ug/L	624*3	KH	10/09/96	15:47
oluene	<5.0	ug/L	624*3	KH	10/09/96	15:47
thylbenzene	<10	ug/L	624*3	KH	10/09/96	15:47
ylenes, Total	<10	ug/L	624*3	KH	10/09/96	15:47
cenaphthene	<2.0	ug/L	610*3	KH	10/08/96	18:00
cenaphthylene	<4.0	ug/L	610*3	KH	10/08/96	18:00
nthracene	<2.0	ug/L	610*3	KH	10/08/96	18:00
enzo(a)anthracene	<8.0	ug/L	610*3	KH	10/08/96	18:00
enzo(a)pyrene	<3.0	ug/L	610*3	KH	10/08/96	18:00
enzo(b)fluoranthene	<5.0	ug/L	610*3	KH	10/08/96	18:00
enzo(ghi)perylene	<5.0	ug/L	610*3	KH	10/08/96	18:00
enzo(k)fluoranthene	<3.0	ug/L	610*3	KH	10/08/96	18:00
hrysene	<3.0	ug/L	610*3	KH	10/08/96	18:00
ibenzo(a,h)anthracene	<3.0	ug/L	610*3	KH	10/08/96	18:00
luoranthene	<3.0	ug/L	610*3	KH	10/08/96	18:00
luorene	<2.0	ug/L	610*3	KH	10/08/96	18:00
ideno(1,2,3-cd)pyrene	<4.0	ug/L	610*3	KH	10/08/96	18:00
aphthalene	<2.0	ug/L	610*3	KH	10/08/96	18:00
henanthrene	<6.0	ug/L	610*3	KH	10/08/96	18:00
yrene	<2.0	ug/L	610*3	KH	10/08/96	18:00
-Methylnaphthalene	<10	ug/L	610*3	KH	10/08/96	18:00
-Methylnaphthalene	<10	ug/L	610*3	KH	10/08/96	18:00

Reviewed By Angie Thorne

ENVIRONMENTAL SERVICE LABORATORIES, INC.

B.E.C.C.
2704 20th St. South Suite 200
Homewood, AL 35209

Attn: Marty Burford

Lab Number	DA15741
Date Received	10/03/96
Sample Date	10/03/96
Sample Time	13:05
Sample Matrix	WATER
Sample Description	MW#3

TEST METHODS:

*1-Standard Methods for the Examination of Water and Wastewater, 18th Edition, 1992.
*2-Methods for Chemical Analysis of Water and Wastes, EPA March, 1983.
*3-EPA Methods for Organic Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057, July, 1982.
*4-Methods for Evaluating Solid Waste Physical/Chemical Methods SW-836, Third Edition, November, 1986.

PARAMETER	DATA	UNITS	METHOD	ANALYST	DATE	TIME
Benzene	<5.0	ug/L	624*3	KH	10/09/96	16:31
Toluene	<5.0	ug/L	624*3	KH	10/09/96	16:31
Ethylbenzene	<10	ug/L	624*3	KH	10/09/96	16:31
Xylenes, Total	<10	ug/L	624*3	KH	10/09/96	16:31
Acenaphthene	<2.0	ug/L	610*3	KH	10/08/96	18:42
Acenaphthylene	<4.0	ug/L	610*3	KH	10/08/96	18:42
Anthracene	<2.0	ug/L	610*3	KH	10/08/96	18:42
Benzo(a)anthracene	<8.0	ug/L	610*3	KH	10/08/96	18:42
Benzo(a)pyrene	<3.0	ug/L	610*3	KH	10/08/96	18:42
Benzo(b)fluoranthene	<5.0	ug/L	610*3	KH	10/08/96	18:42
Benzo(ghi)perylene	<5.0	ug/L	610*3	KH	10/08/96	18:42
Benzo(k)fluoranthene	<3.0	ug/L	610*3	KH	10/08/96	18:42
Chrysene	<3.0	ug/L	610*3	KH	10/08/96	18:42
Dibenzo(a,h)anthracene	<3.0	ug/L	610*3	KH	10/08/96	18:42
Fluoranthene	<3.0	ug/L	610*3	KH	10/08/96	18:42
Fluorene	<2.0	ug/L	610*3	KH	10/08/96	18:42
Indeno(1,2,3-cd)pyrene	<4.0	ug/L	610*3	KH	10/08/96	18:42
Naphthalene	<2.0	ug/L	610*3	KH	10/08/96	18:42
Phenanthrene	<6.0	ug/L	610*3	KH	10/08/96	18:42
Pyrene	<2.0	ug/L	610*3	KH	10/08/96	18:42
2-Methylnaphthalene	<10	ug/L	610*3	KH	10/08/96	18:42
1-Methylnaphthalene	<10	ug/L	610*3	KH	10/08/96	18:42

Reviewed By Angie Shane

P.O. Box 19964
Birmingham, Alabama 35219
PHONE: 942-5995

P.O. Box 2866
Decatur, Alabama 35602
PHONE: 350-3385

ENVIRONMENTAL SERVICE LABORATORIES, INC.

B.E.C.C.
2704 20th St. South Suite 200
Homewood, AL 35209

Attn: Marty Burford

Lab Number	DA15742
Date Received	10/03/96
Sample Date	10/02/96
Sample Time	09:00
Sample Matrix	WATER
Sample Description	MW #4

EST METHODS:

-Standard Methods for the Examination of Water and Wastewater, 18th Edition, 1992.
-Methods for Chemical Analysis of Water and Wastes, EPA March, 1983.
-EPA Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057, July, 1982.
-Methods for Evaluating Solid Waste Physical/Chemical Methods SW-846, Third Edition, November, 1986.

ARAMETER	DATA	UNITS	METHOD	ANALYST	DATE	TIME
nzene	<5.0	ug/L	624*3	KH	10/09/96	17:17
luene	<5.0	ug/L	624*3	KH	10/09/96	17:17
hylbenzene	<10	ug/L	624*3	KH	10/09/96	17:17
lenes, Total	<10	ug/L	624*3	KH	10/09/96	17:17
enaphthene	<2.0	ug/L	610*3	KH	10/08/96	19:25
enaphthylene	<4.0	ug/L	610*3	KH	10/08/96	19:25
thracene	<2.0	ug/L	610*3	KH	10/08/96	19:25
nzo(a)anthracene	<8.0	ug/L	610*3	KH	10/08/96	19:25
nzo(a)pyrene	<3.0	ug/L	610*3	KH	10/08/96	19:25
nzo(b)fluoranthene	<5.0	ug/L	610*3	KH	10/08/96	19:25
nzo(ghi)perylene	<5.0	ug/L	610*3	KH	10/08/96	19:25
nzo(k)fluoranthene	<3.0	ug/L	610*3	KH	10/08/96	19:25
rysene	<3.0	ug/L	610*3	KH	10/08/96	19:25
benzo(a,h)anthracene	<3.0	ug/L	610*3	KH	10/08/96	19:25
uoranthene	<3.0	ug/L	610*3	KH	10/08/96	19:25
uorene	<2.0	ug/L	610*3	KH	10/08/96	19:25
deno(1,2,3-cd)pyrene	<4.0	ug/L	610*3	KH	10/08/96	19:25
phthalene	<2.0	ug/L	610*3	KH	10/08/96	19:25
enanthrene	<6.0	ug/L	610*3	KH	10/08/96	19:25
rene	<2.0	ug/L	610*3	KH	10/08/96	19:25
Methylnaphthalene	<10	ug/L	610*3	KH	10/08/96	19:25
Methylnaphthalene	<10	ug/L	610*3	KH	10/08/96	19:25

Reviewed By Angie Thaine

P.O. Box 19964
Birmingham, Alabama 35219
PHONE: 942-5995

P.O. Box 2866
Decatur, Alabama 35602
PHONE: 350-3385

ENVIRONMENTAL SERVICE LABORATORIES, INC.

B.E.C.C.
2704 20th St. South Suite 200
Homewood, AL 35209

Attn: Marty Burford

Lab Number	DA15743
Date Received	10/03/96
Sample Date	10/03/96
Sample Time	13:50
Sample Matrix	WATER
Sample Description	MW #5

TEST METHODS:

*1-Standard Methods for the Examination of Water and Wastewater, 18th Edition, 1992.
*2-Methods for Chemical Analysis of Water and Wastes, EPA March, 1983.
*3-EPA Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057, July, 1982.
*4-Methods for Evaluating Solid Waste Physical/Chemical Methods SW-846, Third Edition, November, 1986.

PARAMETER	DATA	UNITS	METHOD	ANALYST	DATE	TIME
Benzene	<5.0	ug/L	624*3	KH	10/09/96	18:03
Toluene	<5.0	ug/L	624*3	KH	10/09/96	18:03
Ethylbenzene	<10	ug/L	624*3	KH	10/09/96	18:03
Xylenes, Total	<10	ug/L	624*3	KH	10/09/96	18:03
Acenaphthene	<2.0	ug/L	610*3	KH	10/08/96	20:07
Acenaphthylene	<4.0	ug/L	610*3	KH	10/08/96	20:07
Anthracene	<2.0	ug/L	610*3	KH	10/08/96	20:07
Benzo(a)anthracene	<8.0	ug/L	610*3	KH	10/08/96	20:07
Benzo(a)pyrene	<3.0	ug/L	610*3	KH	10/08/96	20:07
Benzo(b)fluoranthene	<5.0	ug/L	610*3	KH	10/08/96	20:07
Benzo(ghi)perylene	<5.0	ug/L	610*3	KH	10/08/96	20:07
Benzo(k)fluoranthene	<3.0	ug/L	610*3	KH	10/08/96	20:07
Chrysene	<3.0	ug/L	610*3	KH	10/08/96	20:07
Dibenzo(a,h)anthracene	<3.0	ug/L	610*3	KH	10/08/96	20:07
Fluoranthene	<3.0	ug/L	610*3	KH	10/08/96	20:07
Fluorene	<2.0	ug/L	610*3	KH	10/08/96	20:07
Indeno(1,2,3-cd)pyrene	<4.0	ug/L	610*3	KH	10/08/96	20:07
Naphthalene	<2.0	ug/L	610*3	KH	10/08/96	20:07
Phenanthrene	<6.0	ug/L	610*3	KH	10/08/96	20:07
Pyrene	<2.0	ug/L	610*3	KH	10/08/96	20:07
2-Methylnaphthalene	<10	ug/L	610*3	KH	10/08/96	20:07
1-Methylnaphthalene	<10	ug/L	610*3	KH	10/08/96	20:07

Reviewed By Angie Thame

P.O. Box 19964
Birmingham, Alabama 35219
PHONE: 942-5995

P.O. Box 2866
Decatur, Alabama 35602
PHONE: 350-3385

ENVIRONMENTAL SERVICE LABORATORIES, INC.

B.E.C.C.
2704 20th St. South Suite 200
Homewood, AL 35209

Attn: Marty Burford

Lab Number	DA15744
Date Received	10/03/96
Sample Date	10/02/96
Sample Time	12:30
Sample Matrix	WATER
Sample Description	MW #1-5

TEST METHODS:

*1-Standard Methods for the Examination of Water and Wastewater, 18th Edition 1992.
*2-Methods for Chemical Analysis of Water and Wastes, EPA March, 1983.
*3-EPA Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA6--/4-82-057, July, 1982.
*4-Methods for Evaluating Solid Waste Physical/Chemical Methods SW-846, Third Edition, November, 1986.

PARAMETER	DATA	UNITS	METHOD	ANALYST	DATE	TIME
Benzene	<125	ug/L	624*3	KH	10/10/96	17:36
Toluene	<125	ug/L	624*3	KH	10/10/96	17:36
Ethylbenzene	<250	ug/L	624*3	KH	10/10/96	17:36
Xylenes, Total	<250	ug/L	624*3	KH	10/10/96	17:36
Acenaphthene	<2.0	ug/L	610*3	KH	10/08/96	20:50
Acenaphthylene	<4.0	ug/L	610*3	KH	10/08/96	20:50
Anthracene	<2.0	ug/L	610*3	KH	10/08/96	20:50
Benzo(a)anthracene	<8.0	ug/L	610*3	KH	10/08/96	20:50
Benzo(a)pyrene	<3.0	ug/L	610*3	KH	10/08/96	20:50
Benzo(b)fluoranthene	<5.0	ug/L	610*3	KH	10/08/96	20:50
Benzo(ghi)perylene	<5.0	ug/L	610*3	KH	10/08/96	20:50
Benzo(k)fluoranthene	<3.0	ug/L	610*3	KH	10/08/96	20:50
Chrysene	<3.0	ug/L	610*3	KH	10/08/96	20:50
Dibenzo(a,h)anthracene	<3.0	ug/L	610*3	KH	10/08/96	20:50
Fluoranthene	<3.0	ug/L	610*3	KH	10/08/96	20:50
Fluorene	<2.0	ug/L	610*3	KH	10/08/96	20:50
Indeno(1,2,3-cd)pyrene	<4.0	ug/L	610*3	KH	10/08/96	20:50
Naphthalene	<2.0	ug/L	610*3	KH	10/08/96	20:50
Phenanthrene	<6.0	ug/L	610*3	KH	10/08/96	20:50
Pyrene	<2.0	ug/L	610*3	KH	10/08/96	20:50
2-Methylnaphthalene	<10	ug/L	610*3	KH	10/08/96	20:50
1-Methylnaphthalene	<10	ug/L	610*3	KH	10/08/96	20:50

Reviewed By Angie Frame

P.O. Box 19964
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APPENDIX F

BORING LOGS AND WELL INSTALLATION INFORMATION

ALABAMA AIR NATIONAL GUARD
HEADQUARTERS, 117TH AIR REFUELING WING (AMC)
BIRMINGHAM, ALABAMA 35217-3595

10 Nov 95

MEMORANDUM FOR: ADEM/SPECIAL PROJECTS
ATTENTION: Chris Johnson

FROM: 117ARW/EM
5401 East Lake Blvd
Birmingham, Alabama 35217-3595

SUBJECT: Monitoring Well Installation Plan for IRP Site 11.
Incident No. UST88-04-05.

1. Reference; Air National Guard letter dated 14 Aug 1995, subject same as above.

2. The ANG letter dated 14 Aug 95 proposed to install four residuum monitoring wells at IRP Site 11. These four wells were to be installed to comply with ADEM underground storage tank closure requirements as well as replace monitoring wells MW-07, MW-12 and MW-13 which were removed during the soil remediation process.

3. Upon further review, the ANG is concerned that installing monitoring wells in the new aircraft apron might not be in the best interest of the environment. If monitoring wells are installed into the aircraft apron they might provide a conduit for jet fuel to enter the water table if a fuel spill were to occur.

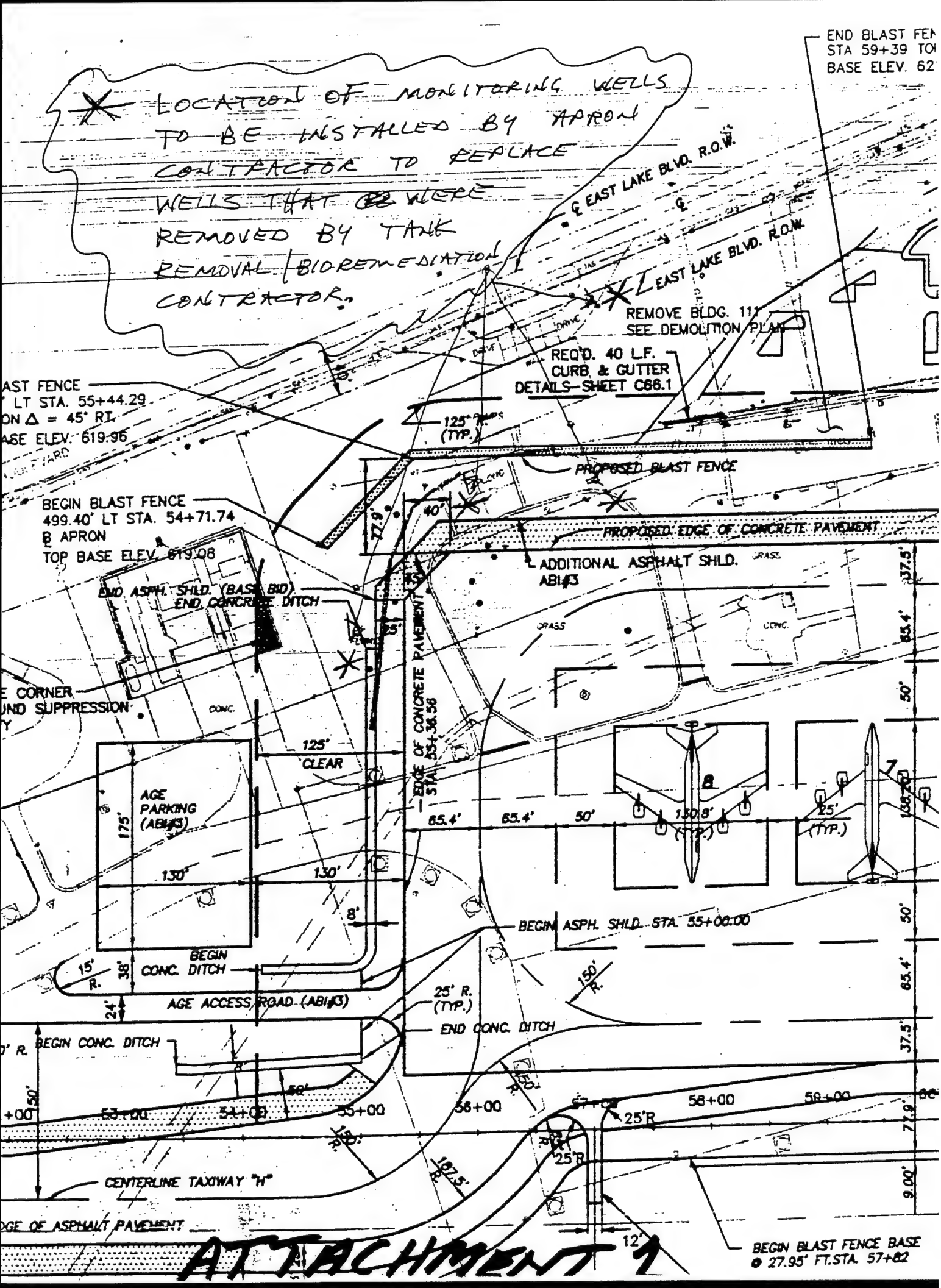
4. The ANG would like to make a new proposal which would still provide four monitoring wells but the wells would be located in an area off the aircraft apron. The new proposal would provide one up gradient well and three down gradient wells, however the locations would different. The new locations would be less likely to provide a conduit for jet fuel to enter the water table. The proposed well locations can be seen in attachment one while the old proposal can be seen in attachment two.

5. Please review the proposal and provide comments at your earliest convenience. If you have any questions please give me a call, (205) 841-9504.

Glenn F. Bailey

GLENN F. BAILEY, 1LT, AL ANG
Base Environmental Engineer

cc:
Maj Blakeley
Mrs Ruth L. Lodder



ATTACHMENT 1

ALABAMA AIR NATIONAL GUARD
HEADQUARTERS, 117TH AIR REFUELING WING (AMC)
BIRMINGHAM, ALABAMA 35217-3595

14 Aug 95

MEMORANDUM FOR: ADEM/SPECIAL PROJECTS
ATTENTION: Chris Johnson

FROM: 117ARW/EM
5401 East Lake Blvd
Birmingham, Alabama 35217-3595

SUBJECT: UST Closure and Corrective Action Reports for IRP Site 11 at Birmingham
Facility I.D. No. 10077-073-001912 Incident No. UST88-04-05

1. Reference; ADEM letter dated 27 July 95, subject same as above.

2. It was our understanding from past meetings and telephone conversations with ADEM Special Projects that monitoring wells MW-07, MW-12 and MW-13 were approved for removal. The three wells were residuum wells which required removal in order to remediate the surrounding TPH contaminated soil. It was our understanding that the three wells could be removed if they were replaced at the end of the clean-up effort with one up-gradient and three down-gradient wells.

3. All contaminated soil (equal or greater than 100 TPH) has been remediated and we are submitting the proposed monitoring well locations for your concurrence. The enclosed site plan indicates where MW-07, MW-12 and MW-13 were located. It is our intention to install the up gradient monitoring well as indicated in the site plan and replace the three down gradient monitoring wells as close to their original location as possible. The replacement wells are scheduled to be installed with the Aircraft Apron Project in December 1995.

4. As you know the 117 ARW requires IRP Site 11 for the $ 15,000,000 Aircraft Apron Project which is essential to our Federal and State mission. The ANG believes no further action is warranted for the soil at Site 11. The groundwater is scheduled to be addressed when funding is available for the Remedial Investigation.

ATTACHMENT 2

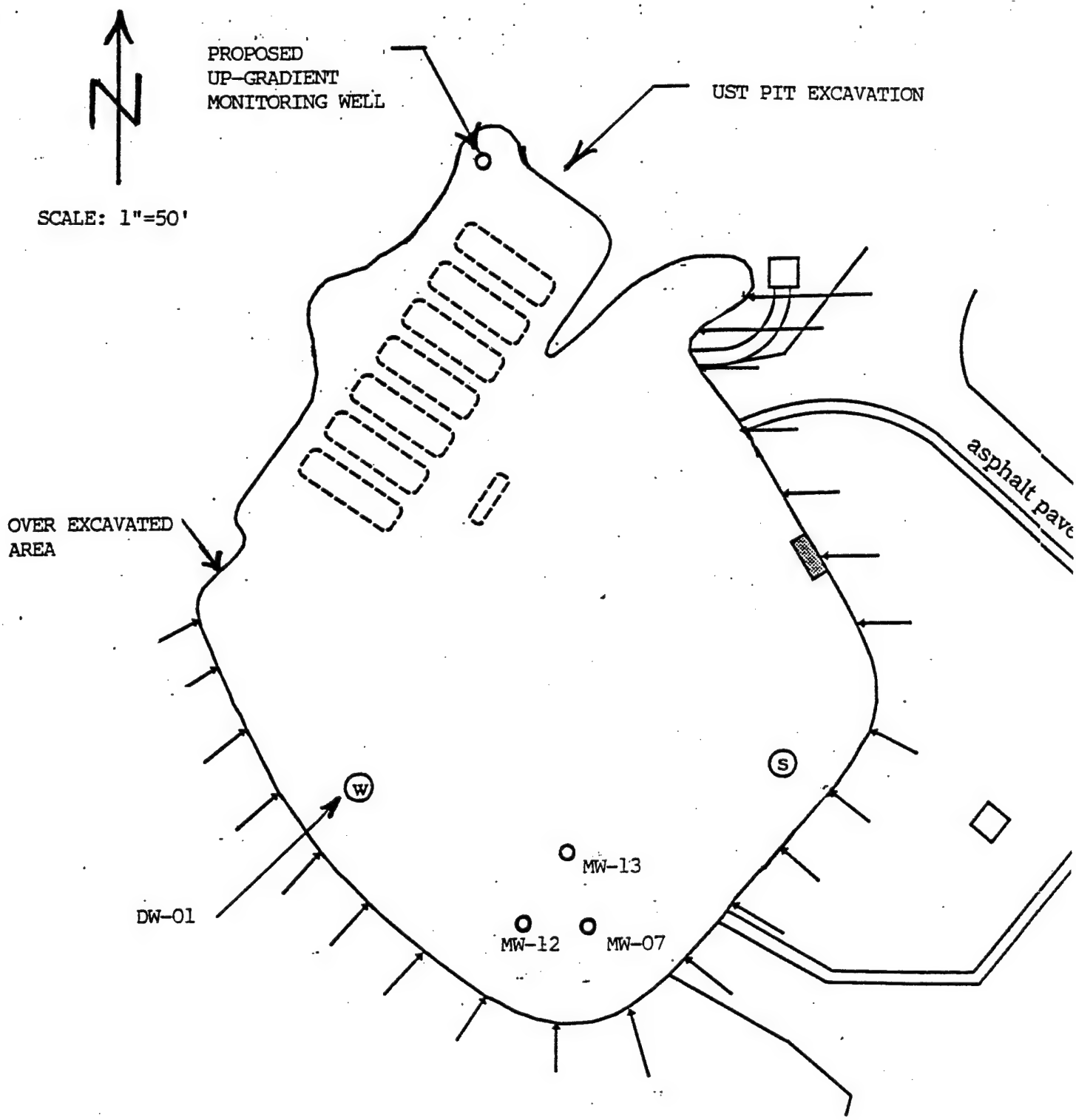
5. Please review the site plan and provide any written comments by 4 September 1995.

6. If you have any questions please give me a call, (205) 841-9504.

Glenn F. Bailey

GLENN F. BAILEY, 1LT, AL ANG
Base Environmental Engineer

cc:
Col Copeland
Maj Blakeley
Mrs Ruth Lodder
Mr James Bryant
Ms Stephanie Carter


N
PROPOSED
UP-GRADIENT
MONITORING WELL
UST PIT EXCAVATION
SCALE: 1"=50'
OVER EXCAVATED
AREA
asphalt pave
W
S
MW-13
DW-01
MW-12
MW-07

IRP SITE 11

BECC

Birmingham Engineering & Construction Consultants, Inc.

November 22, 1996

I hereby certify that the (equipment) (material) [illegible] in this submittal is that proposed to be incorporated [illegible] DAHA01-95-C-0008 is in compliance with the Contract [illegible] specification, can be installed in the allocated spaces, and is submitted for Government approval. Government approval of proposed [illegible] is recommended.

Certified by Contractor _____ Date 12/3/96
(Signature)

Mr. Steve Ruether
Bell Constructors
P.O. Box 170578
Birmingham, Alabama 35217

Subject: Monitoring Well Installation
Aircraft Apron/ Hydrant Refueling System
BECC Project Number 450046

Dear Mr. Ruether:

Birmingham Engineering and Construction Consultants, Inc. (BECC) has completed installation of five monitoring wells as discussed in proposal 5030 dated April 18, 1995. The monitor wells were installed following the specifications section 02940, titled **Monitor Wells**, at the Birmingham Air National Guard. The exact location for the wells were given to BECC by Captain Glenn Bailey of the Birmingham Air National Guard.

DISCUSSION

The wells were drilled by means of mechanically twisting hollow-stem, continuous steel auger flights. Split spoon samples were taken every 5 feet. The samples were obtained with a standard 1.4 inch I.D. split spoon sampler. The sampler was seated 6 inches to penetrate any loose material then driven an additional 12 inches from blows of a 140 pound hammer falling 30 inches. The standard penetration resistance (N), or number of blows to sink the hammer 12 inches, was recorded. The wells were constructed using schedule 40 PVC 2-inch I.D. casing & screen. The screen casing consisted of 10 foot sections slotted to 0.010-inch slot openings. Bagged silica sand was then poured into the well to a depth of at least 2 feet above the screen casing. A Bentonite seal a minimum of 2 feet thick was placed on top of the sand. The well was then grouted using Portland cement to within 1 foot of the land surface. A man-hole cover (clearly marked monitor/observation well) was installed over the well and a concrete pad 3 feet by 3 feet by 6 inches was formed. The wells were then developed by purging. All soil trimmings & purged water was collected and placed in 55-gallon drums and left on site. The drums were collected and stored by the Birmingham Air National Guard.

A composite soil sample was obtained from all five monitoring wells with the split spoon sampler. A representative sample of the soil cuttings was delivered to Environmental Service Laboratories, Inc. for a TPH test. A representative sample of the purged water was taken from the drum for a B-TEX and PAH test. Each individual well was tested after development for B-TEX and PAH. The test results as well as the chain of custody are attached.

Details of the subsurface conditions encountered are shown in the Log of Borings. The stratification lines on the logs indicate different soil types encountered. Though the lines are shown at exact depths, the boundaries are gradual and are approximate. The conditions represented by these borings should be considered applicable only at the locations shown, and may be different at other locations.

SUBSURFACE CONDITIONS

The following is a summary of the soil conditions that were encountered at the time of drilling operations. The well coordinates and elevations were supplied to BECC by Bell Constructors. Please refer to the log of borings in the Appendix for a detailed representation of the well profile.

Monitor Well No. 1

Monitor well no. 1 (MW-1) was drilled adjacent to the existing POL facility. The well was drilled through 1 foot of crushed aggregate base. Backfill consisting of a well sorted fine sand overlying a poorly sorted coarse, pebbly sand was encountered at a depth of 1 foot to 5 1/2 feet. The standard penetration resistance (N-value) for the sand was 1 bpf.

A tan and red cherty clay with some organic material was encountered at 5.5 feet. The clay continued until the termination depth of 22.5 feet. The standard penetration resistance (N-value) ranged from 9 to 11 bpf. Groundwater was encountered at a depth of 17 feet. Ten feet of screen and 15 feet of well casing was installed into the well. Two to three feet of casing was left above the base material. Due to the unfinished condition of the surrounding area the concrete pad around the well will be molded at a later date.

Monitor Well No. 2

Monitor well no. 2 was drilled through 10 inches of grass and top soil. Underlying the top soil was a dark brown silty clay w/ rock fragments to a tan and red clay that continued to the well termination depth of 38 feet. The standard penetration resistance (N-value) of the clay ranged from 6 near the surface to 34 bpf. Groundwater was encountered at a depth of 38 feet. Ten feet of screen and 27 feet of well casing was installed into the well.

Monitor Well No. 3

Monitor well no. 3 was drilled through 6 inches of asphalt. Below the asphalt, 10 to 18 inches of crushed aggregate base was encountered. Ten to 18 inches of a clay-gravel subbase was encountered below the base material. The soil encountered beneath the subbase was a tan to white silty clay and continued to the well termination depth of 19.5

feet. The standard penetration resistance (N-value) of the clay ranged from 6 to 24 bpf. Groundwater was encountered at a depth of 16.5 feet. Ten feet of screen and 9 feet of well casing was installed into the well.

Monitor Well No. 4

Monitor well no. 4 was drilled through 6 inches of asphalt. Below the asphalt, 10 to 18 inches of crushed aggregate base was encountered. Ten to 18 inches of subbase consisting of a clay and gravel mix was encountered below the base material. Below the subbase, the soil consisted of a tan to light gray clay and continued to the well termination depth of 19.3 feet. The standard penetration resistance (N-value) of the clay ranged from 6 near the water table to 12 bpf. Groundwater was encountered at 17 feet. Ten feet of screen and 9 feet of well casing was installed into the well.

Monitor Well No. 5

Monitor well no. 5 was drilled through 6 inches of asphalt. Below the asphalt, 10 to 18 inches of crushed aggregate base was encountered. Ten to 18 inches of subbase was encountered below the base material. The subbase consisted of a clay and gravel mix. The soil below the subbase consisted of a tan and red clay to a tan sandy, silty clay and continued to the well termination depth of 19 feet. The standard penetration resistance (N-value) of the clay ranged from 8 to12 bpf. Groundwater was encountered at a depth of 17 feet. Ten feet of screen and 9 feet of well casing was installed into the well.

We appreciate the opportunity to be of service to you on this project. If you have any comments or questions concerning the information contained in this packet, or if we may be of any further assistance to you, please contact our office at your convenience.

Respectfully Submitted

BECC, INC.

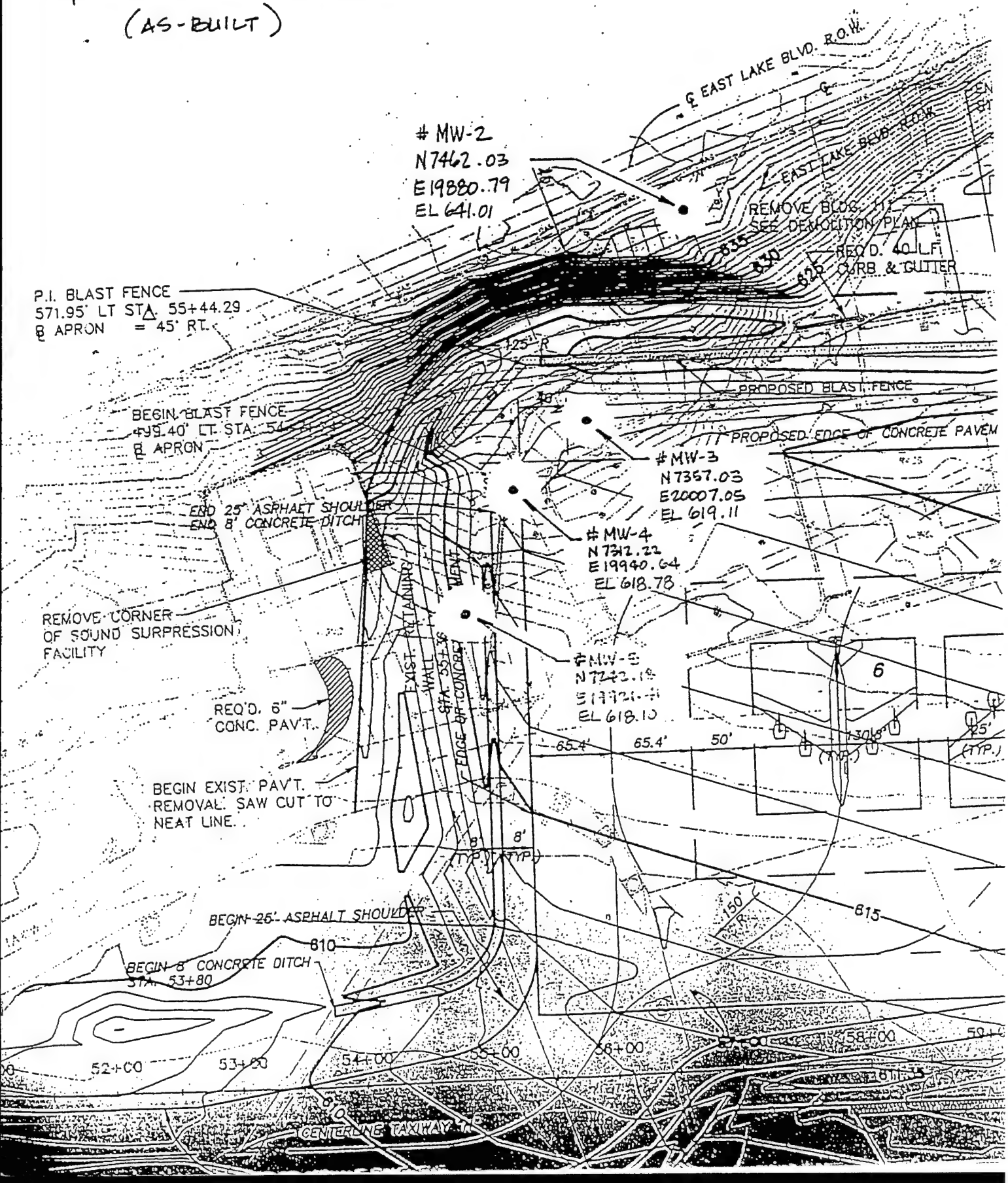
Martin T. Burford, E.I.T.
Project Manager

☑ REVIEWED ☐ REVISE AND RESUBMIT
☐ REJECTED ☐ FURNISH AS CORRECTED

Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

CECIL JONES & ASSOCIATES, INC.
Date 1/28/97 By KWG

Monitor Well Locations
(As-Built)



MW-2	DEPTH	38'	
	DIA	2"	
	CASING	27'	SCHEDULE 40 PVC
	SCREEN	10'	STAINLESS 0.01" SLOTS
MW-3	DEPTH	19.5'	
	DIA	2"	
	CASING	9'	SCHEDULE 40 PVC
	SCREEN	10'	STAINLESS 0.01" SLOTS
MW-4	DEPTH	19.3'	
	DIA	2"	
	CASING	9'	SCHEDULE 40 PVC
	SCREEN	10'	STAINLESS 0.01" SLOTS
MW-5	DEPTH	19'	
	DIA	2"	
	CASING	9'	SCHEDULE 40 PVC
	SCREEN	10'	STAINLESS 0.01" SLOTS

NOTE: THERE IS NO MW-1 ASSOCIATED WITH THIS SITE (IRP SITE 11).

LOG OF BORING

SHEET 1 OF 2

CONTRACTED WITH: Bell Contractors, Inc.

MONITORING WELL NO.: MW-1

PROJECT NAME: Apron/Hydrant Refueling System

JOB NO.: 450046

DATE: 9-30-96

ELEV. (ft)	DESCRIPTION	DEPTH (ft)	SAMPLES NO	SAMPLES TYPE	SAMPLES BLOWS/6"	SAMPLES N	M%	NOTES
622.50		0						Surface elevations were estimated from topographic maps provided by Bell Constructors, Inc.
	Crushed Aggregate Base							
	Fill-Tan, coarse sand with round gravel		1	SS	1-0-1	1		
		5						
	Tan and red cherty CLAY with little organics		2	SS	4-5-6	11		
		10						
			3	SS	3-3-7	10		
		15						
			4	SS	3-4-5	9		▼ Groundwater was encountered at 17 ft. at the time of drilling operations.
		20						

N - STANDARD PENETRATION RESISTANCE IN BLOWS PER 305 mm
SS - SPLIT SPOON SAMPLE FOR RECOVERY OF BOTTLE SAMPLES
M% - PERCENT NATURAL MOISTURE CONTENT
RQD - ROCK QUALITY DESIGNATION
▼ - WATER LEVEL

Birmingham Engineering & Construction Consultants, Inc.
2704 20th Street South, Suite 200, Birmingham. AL 35209

LOG OF BORING

SHEET 2 OF 2

CONTRACTED WITH: Bell Contractors, Inc. MONITORING WELL NO.: MW-1

PROJECT NAME: Apron/Hydrant Refueling System JOB NO.: 450046 DATE: 9-30-96

ELEV. (ft)	DESCRIPTION	DEPTH (ft)	SAMPLES				M%	NOTES
			NO	TYPE	BLOWS/6"	N		
		20						Surface elevations were estimated from topographic maps provided by Bell Constructors, Inc.
	Tan, coarse sand with round gravel							
	Boring terminated at 22.5 ft.	25						
		30						
		35						
		40						

N - STANDARD PENETRATION RESISTANCE IN BLOWS PER 305 mm
SS - SPLIT SPOON SAMPLE FOR RECOVERY OF BOTTLE SAMPLES
M% - PERCENT NATURAL MOISTURE CONTENT
RQD - ROCK QUALITY DESIGNATION

Birmingham Engineering & Construction Consultants, Inc.
2704 20th Street South, Suite 200, Birmingham. AL 35209

LOG OF BORING

SHEET 1 OF 2

CONTRACTED WITH: Bell Contractors, Inc.

MONITORING WELL NO.: MW-2

PROJECT NAME: Apron/Hydrant Refueling System

JOB NO.: 450046

DATE: 10-1-96

ELEV. (ft)	DESCRIPTION	DEPTH (ft)	SAMPLES NO	TYPE	BLOWS/6"	N	M%	NOTES
744.18		0						Surface elevations were estimated from topographic maps provided by Bell Constructors, Inc.
	Topsoil							
	Dark Brown Silty CLAY w/ rock fragments		1	SS	2-3-3	6		
		5						
	Red and tan CLAY		2	SS	10-13-17	30		
		10						
		15	3	SS	6-15-19	34		
			4	SS	5-7-10	17		
		20						

N - STANDARD PENETRATION RESISTANCE IN BLOWS PER 305 mm
SS - SPLIT SPOON SAMPLE FOR RECOVERY OF BOTTLE SAMPLES
M% - PERCENT NATURAL MOISTURE CONTENT
RQD - ROCK QUALITY DESIGNATION
▼ - WATER LEVEL

Birmingham Engineering & Construction Consultants, Inc.
2704 20th Street South, Suite 200, Birmingham. AL 35209

LOG OF BORING

SHEET 2 OF 2

CONTRACTED WITH: Bell Contractors, Inc. MONITORING WELL NO.: MW-2

PROJECT NAME: Apron/Hydrant Refueling System JOB NO.: 450046 DATE: 9-30-96

ELEV. (ft)	DESCRIPTION	DEPTH (ft)	SAMPLES NO	SAMPLES TYPE	SAMPLES BLOWS/6"	SAMPLES N	M%	NOTES
		20						Surface elevations were estimated from topographic maps provided by Bell Constructors, Inc.
	Tan and red CLAY	25						
		30						
		35						▼ Groundwater was encountered at 35.5 ft. at the time of drilling operations.
	Boring Terminated at 38.0 ft.	40						

N - STANDARD PENETRATION RESISTANCE IN BLOWS PER 305 mm
SS - SPLIT SPOON SAMPLE FOR RECOVERY OF BOTTLE SAMPLES
M% - PERCENT NATURAL MOISTURE CONTENT
RQD - ROCK QUALITY DESIGNATION

Birmingham Engineering & Construction Consultants, Inc.
2704 20th Street South, Suite 200, Birmingham. AL 35209

LOG OF BORING

SHEET 1 OF 1

CONTRACTED WITH: Bell Contractors, Inc.

MONITORING WELL NO.: MW-3

PROJECT NAME: Apron/Hydrant Refueling System

JOB NO.: 450046

DATE: 9-30-96

ELEV. (ft)	DESCRIPTION	DEPTH (ft)	SAMPLES NO	TYPE	BLOWS/6"	N	M%	NOTES
583.53		0						Surface elevations were estimated from topographic maps provided by Bell Constructors, Inc.
	7" Asphalt							
	Crushed Aggregate Base							
	FILL-Dry, tan and light gray CLAY with some organics							
		5	1	SS	4-5-7	12		
			2	SS	3-5-7	12		
		10						
			3	SS	3-3-4	7		
		15						
	Tan and red sandy CLAY with some gravel							▼ Groundwater was encountered at 17 ft. at the time of drilling operations.
			4	SS	4-2-4	6		
	Boring Terminated at 19.3 ft.	20						

N - STANDARD PENETRATION RESISTANCE IN BLOWS PER 305 mm
SS - SPLIT SPOON SAMPLE FOR RECOVERY OF BOTTLE SAMPLES
M% - PERCENT NATURAL MOISTURE CONTENT
RQD - ROCK QUALITY DESIGNATION
▼ - WATER LEVEL

Birmingham Engineering & Construction Consultants, Inc.
2704 20th Street South, Suite 200, Birmingham. AL 35209

LOG OF BORING

SHEET 1 OF 1

CONTRACTED WITH: Bell Contractors, Inc. MONITORING WELL NO.: MW-4

PROJECT NAME: Apron/Hydrant Refueling System JOB NO.: 450046 DATE: 9-30-96

ELEV. (ft)	DESCRIPTION	DEPTH (ft)	SAMPLES NO	TYPE	BLOWS/6"	N	M%	NOTES
593.32		0						Surface elevations were estimated from topographic maps provided by Bell Constructors, Inc.
	7" Asphalt							
	Crushed Aggregate Base							
	FILL-Dry, tan and light gray CLAY with some organics		1	SS	4-5-7	12		
		5						
			2	SS	3-5-7	12		
		10						
			3	SS	3-3-4	7		
		15						
	Tan and red sandy CLAY with some gravel							▼ Groundwater was encountered at 17 ft. at the time of drilling operations.
			4	SS	4-2-4	6		
	Boring Terminated at 19.3 ft.	20						

N - STANDARD PENETRATION RESISTANCE IN BLOWS PER 305 mm
SS - SPLIT SPOON SAMPLE FOR RECOVERY OF BOTTLE SAMPLES
M% - PERCENT NATURAL MOISTURE CONTENT
RQD - ROCK QUALITY DESIGNATION
▼ - WATER LEVEL

Birmingham Engineering & Construction Consultants, Inc.
2704 20th Street South, Suite 200, Birmingham. AL 35209

LOG OF BORING

SHEET 1 OF 1

CONTRACTED WITH: Bell Contractors, Inc.

MONITORING WELL NO.: MW-5

PROJECT NAME: Apron/Hydrant Refueling System

JOB NO.: 450046

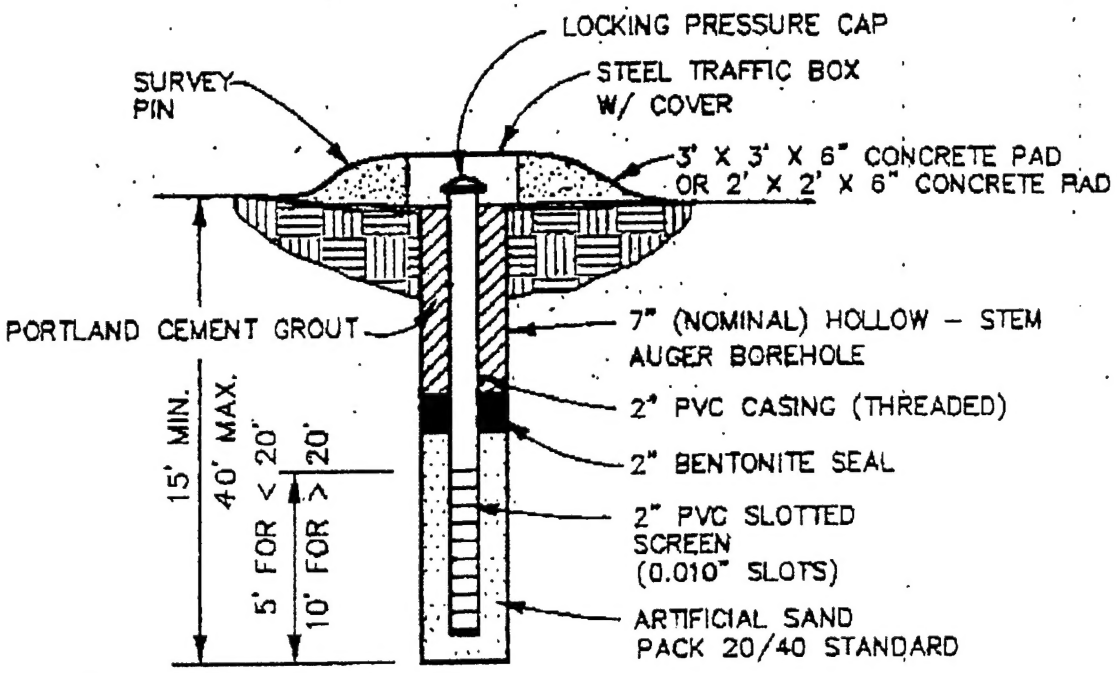
DATE: 10-1-96

ELEV. (ft)	DESCRIPTION	DEPTH (ft)	SAMPLES NO	TYPE	BLOWS/6"	N	M%	NOTES
561.11		0						Surface elevations were estimated from topographic maps provided by Bell Constructors, Inc.
	5 " Asphalt Crushed Aggregate Base							
	Tan and red CLAY with sand, gravel and little organics		1	SS	4-4-5	9		
		5						
			2	SS	4-4-5	9		
		10						
			3	SS	3-3-5	8		
		15						
			4	SS	2-6-6	12		▼ Groundwater was encountered at 17.75 ft. at the time of drilling operations.
	Boring terminated at 19 ft.	20						

N - STANDARD PENETRATION RESISTANCE IN BLOWS PER 305 mm
SS - SPLIT SPOON SAMPLE FOR RECOVERY OF BOTTLE SAMPLES
M% - PERCENT NATURAL MOISTURE CONTENT
RQD - ROCK QUALITY DESIGNATION
▼ - WATER LEVEL

Birmingham Engineering & Construction Consultants, Inc.
2704 20th Street South, Suite 200, Birmingham. AL 35209

TYPICAL 2" MONITOR WELL



NOTE: SEE SPECIFICATIONS - SECTION 02940
FOR WELL LOCATIONS

MONITORING WELL DETAILS

NO SCALE.